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INVOLVEMENT OF NGOS IN THE DEVELOPMENT OF RENEWABLE SOURCES OF ENERGY IN AFRICA **

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* Organized jointly by UNIDO and the Association of African Development Finance Institutions (AADFI).

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INTRODUCTION

In implementing the resolutions of the Fourth General Conference of UNIDO, held in Vienna (Austria) from 2 to 19 August 1984, inviting the international community and particularly non-governmental organizations (NGOs) to increase their co-operation with African countries in implementing priority measures under the programme of the International Development Decade for Africa (IDDA), UNIDO, in co-operation with the Association of African Development Finance Institutions (AADFI), decided to organize a forum devoted to the participation of NGOs in the implementation of the IDDA programme, at Abidjan (Ivory Coast) from 27 to 30 August 1985.

Five themes will be the subject of discussion during the meetings of the Abidjan Forum:

(1) food and agro-food industries;

(2) agricultural mechanization;

(3) building and construction materials industries;

(4) energy;

(5) financial aspects of industrial development.

This working document is intended to serve as an introduction to the discussions on theme No. 4 which might be entitled:

"The role of NGOs in the development of renewable energy sources in Africa".

Taking as an example the case of solar energy, one cannot speak of "a new source of energy". It is just that certain technologies are relatively recent. In the text of the report we have adopted the expression "renewable energy".

In the absence of surveys among African states and NGOs, only the experience in Mali and the Sahelian countries is set out in this document. In order to fill this gap, the Forum should invite representatives of NGOs to present their experience in the field of applications of renewable sources of energy.

GLOSSARY 1/

To avoid divergences of interpretation or confusion, the World Bank has given the following definitions to a number of expressions used to designate the various types of energy.

CLASSIC TYPE ENERGY OR CONVENTIONAL ENERGY

Forms of energy which, at the present time, are by far the most common in modern industrial economies: coal (including lignite and peat); petroleum (comprising fuel oil, petrol, kerosene, diesel oil, natural gas and liquid petroleum gas); and electricity produced by the combustion of one of these fuels or by hydro or nuclear energy. Wood is not included in this category, although it was widely used in the past for industrial purposes and to a certain extent still is.

COMMERCIAL ENERGY

Any form of energy sold by a commercial enterprise or public service. This expression is virtually synonymous with "classic type energy" or "conventional energy". Wood and other traditional fuels (see below) are not included in this category although they are frequently the subject of sale transactions.

PRIMARY ENERGY

A form of energy whose use is not preceded by a chemical transformation. This notion is of particular interest in connection with electricity generation, hydroelectric energy being considered as primary energy and thermal electric energy as secondary. Nuclear energy is currently included in primary energy, although, strictly speaking, this classification is incorrect.

RENEWABLE ENERGY

Forms of energy partially or totally regenerated in the course of the annual solar cycle. It is considered, for example, that solar and wind energy, hydro energy and that from fuels of vegetable origin are renewable, while mineral fuels and nuclear energy are not.

FUELS FROM BIOMASS

These are combustible and/or fermentable materials of vegetable origin such as wood, charcoal, maize cobs, cotton stalks, rice chaff, manure compounds.

TRADITIONAL ENERGY

Covers types of energy generally used in "traditional" or pre-industrial societies. These are mainly fuels originating from biomass and this expression is most often considered as excluding mineral fuels and hydro energy, although the use of water mills dates back more than a thousand years.

SOLAR ENERGY

Technologies using solar radiation to supply heat which can be converted into mechanical or electrical power or which can produce electricity directly (photovoltaic cells).

1/ Extract from "L'énergie dans les Pays en développement". (World Bank, August 1980).

1. INTRODUCTION AND HISTORICAL BACKGROUND

Energy is one of the key factors if not the driving force in the development of a country. Energy consumption per head of the population is often used as a criterion for classification into industrialized or developing countries.

The African continent, which is known for its significant potential in agricultural and mineral raw materials, includes only a few oil-exporting countries and a large majority of oil-importing countries, almost all of which have a low income. Energy in Africa is largely imported, and it is therefore a factor in dependence on developed countries which possess the technology and control markets and prices.

Before the first "oil shock" and in the aftermath of independence, African countries had all given priority to agriculture in their economic and social development plans. A number of them, poorly informed of their energy potential and lacking the large capital resources required to exploit local sources of energy, remained dependent on the import of petroleum products to satisfy their energy needs, which were to a large extent created by equipment and technologies themselves imported from industrialized countries.

A few African countries, in an attempt to develop an energy policy based on the use of national energy resources, directed their attention to the exploitation of certain renewable energy resources: energy from rivers (the so-called "white coal"), solar energy and wind power. Such countries include Mali and Senegal in West Africa, which took part in the first world conference on new sources of energy held in Rome.

This initial phase in the history of renewable energy resources was characterized by research, development and laboratory testing of the first prototypes of solar water heaters and cookers, coinciding with the establishment of co-operation between African countries and certain industrialized countries. The pioneers of this period were all researchers, including notably Professors Trombe (France), Masson (University of Dakar, Senegal) and Moumouni (Niger).

The energy crisis, provoked by the savage increase in the price of oil, weighed heavily on the balance of payments and compromised the economic growth of the developing countries. It made authorities in Africa aware of the importance of energy in development and led them to seek alternative solutions based on the exploitation of national resources in order to satisfy energy needs. The renewal of interest by nearly all the African countries in alternative local energy sources, that is renewable energy sources, is due to the major resources of biomass and solar energy.

The serious and continuing drought which has affected the countries of the Sahel since 1972 has given rise to a firewood shortage.

New technologies appeared: photovoltaic cells, improved stoves, etc. while at the same time vast campaigns were organized to involve and inform the populations concerned. Finally, the United Nations Conference on New and Renewable Sources of Energy held in Nairobi (Kenya) made it possible to make international opinion aware of the importance of renewable energy sources. The African Member States of WAEC (West African Economic Community) and ICDCS (Permanent Inter-State Committee on Drought Control in the Sahel) decided to cement their common will for co-operation in the field of renewable energy by forming and setting up the Regional Solar Energy Centre (CRES) whose seat is at Bamako (Mali).

Thanks to laboratory research, field experiments, the spread of new technologies and their adaptation to the socio-cultural environment, the results

achieved by several African countries - particularly those of the Sahel - in the development of applications of renewable energy are encouraging, although certain difficulties must be overcome.

CRES developed a regional programme for renewable energy and lent its support to Member States of WAEC in the preparation of national programmes. The national programme of Mali emphasizes applications of solar energy from photovoltaic sources: solar pumping station for the supply of water and the development of vegetable growing, microelectrification of dispensaries and rural health centres and telecommunications among others.

The aim of this report is to analyze the renewable energy potential, briefly set out the various technological branches, analyze the "state of the art" of the various applications, specify the principal constraints which retard their development and the role played or which could be played by non-governmental organizations in the renewable energy sources sector. Given that energy is a single entity, the analysis of the situation with regard to renewable energy resources must take account of the overall context of energy in Africa and in developing countries.

2. GENERAL REMARKS ON ENERGY IN AFRICA AND IN DEVELOPING COUNTRIES

The level of energy consumption in developing countries, and in Africa in particular, is low in comparison with world consumption. This situation is characteristic of their state of underdevelopment. According to the World Bank, oil-importing developing countries consume only 12 to 15 per cent of world commercial energy. Moreover this energy consumed is almost entirely imported from oil-exporting countries whose ranks include very few African countries.

It is the towns which consume most of the commercial energy, while the countryside and the urban poor use kerosene for cooking and lighting, and above all firewood for the former.

However for a number of reasons, particularly the use of energy equipment and installations imported from developed countries such as transport facilities, electricity generating stations, factories and so on, the growth of energy demand in developing countries exceeds that of their gross national product (GNP).

These countries have significant potential energy resources with regard to traditional and renewable energy resources and a scarcity of commercial resources of energy. Being low income countries, they do not have the major capital necessary to exploit their own local sources of energy.

In these circumstances, in order to satisfy runaway growth in energy demand, developing countries are forced to manage demand more effectively by a rigorous selection of priorities, and by economy and conservation measures, while stimulating and encouraging alternative energy solutions based on local resources.

The energy crisis unleashed by the savage increases in oil prices stimulated the interest of governments in developing countries in developing renewable energy as an alternative source of power.

3. CURRENT RESOURCE SITUATION AND STATE OF THE ART IN APPLICATIONS OF RENEWABLE ENERGY SOURCES

In Africa, 70 to 90 per cent of the energy used in rural areas and poor urban districts is supplied by traditional energy sources, mainly renewable, such as firewood, charcoal, agricultural residues and animal wastes.

Commercial energy is almost entirely a matter of urban consumption, 60 per cent of this energy being consumed by about 20 per cent of the population in the highest income bracket.

Renewable energy sources offer several advantages for developing countries and this is why they are of increasing interest to the authorities there.

As far as potential is concerned, renewable energy sources are the most abundant in developing countries, particularly biomass resources and above all solar and wind power. The Sahelian countries of Africa lie in a geographical region which is particularly favoured with regard to solar radiation. In addition, biomass is also abundant in a few countries which also have an adequate rainfall.

Unfortunately, mainly because of a lack of finance, these renewable energy resources and particularly biomass have been little or poorly evaluated, the available data being clearly inadequate and often fragmentary.

The relatively high cost of commercial energy means that the use of certain types of renewable energy to satisfy the small-scale and decentralized energy needs of scattered populations in rural areas of developing countries is an alternative economically viable solution. Thus the economical use of water, notably for fruit and vegetable irrigation, may make the relatively large investment in a photovoltaic solar pumping station, whose operating and maintenance charges are incidentally negligible, a profitable undertaking.

Although they have very great potential for satisfying their energy needs, developing countries are not mastering renewable energy technologies for lack of capital and experts. Renewable energy can play an important role in attenuating effects of the energy crisis, particularly in rural areas. Governments, for whom rural development is the first priority, have expressed their interest and their wish to develop applications of renewable energy sources and have decided on the launching either of specific projects or programmes on a national scale.

3.1. Potential renewable energy sources

The renewed interest in renewable energy sources has appeared during the last decade as a result of the energy crisis. Basic data on renewable energy sources are either non-existent or inadequate. For lack of an inventory of these resources, one is limited to an arbitrary estimate extrapolated from the available fragmentary data.

Despite this gap, the countries of West Africa have attempted to evaluate the potential of the subregion.

3.1.1. The energy situation in the countries of West Africa

The energy situation in the countries of West Africa is marked by the following predominant features:

- An almost total lack of fossil fuel deposits (coal and oil, except in Nigeria and Ivory Coast), the energy sources which made the prodigious technical and industrial development of Europe and North America in the space of two centuries possible.

- The predominant use of firewood and charcoal to satisfy household energy needs, and at such an intense rate of forest exploitation and using such rudimentary techniques that the ecological future of the zone is seriously compromised (deforestation, even desertification).

- The existence of a large potential in terms of renewable energy sources (solar power, wind power, hydroelectricity, recovered biomass and so on), sources which are still hardly exploited.

The key role of energy in all modern production processes and trade (agriculture, industry, transport, communications, etc.) together with the continued and growing scarcity of classic energy sources is forcing West African countries aiming at development:

- on the one hand, to preserve their forest heritage by improving the mode of exploiting their timber resources (reafforestation, substitution of improved ovens and stoves for those at present used, exploitation of by-products and plant and animal wastes by gasification, pyrolysis or methane fermentation, etc.).
- on the other hand, to promote the spread of renewable energy equipment such as solar collectors and generators, wind motors, hydroelectric generating stations and so on.

3.1.2 Renewable energy resources in West Africa

The picture of the various renewable energy resources for West Africa is currently as follows:

3.1.2.1. Animal and vegetable biomass energy

3.1.2.1.1. Firewood and charcoal

These still provide 80 to 90 per cent of energy used in West Africa, particularly for domestic needs (cooking, heating water) and crafts (forging, brickmaking, pottery).

The evaluation of regional consumption is difficult because of the scarcity of statistics and discrepancies between the various information sources. Some countries, which are members of CRES (Regional Solar Energy Centre), have estimated consumption as follows:

COUNTRY	CONSUMPTION OF WOOD AND CHARCOAL	REFERENCE YEAR	PERCENTAGE OF NATIONAL ENERGY CONSUMPTION
	(tpe/year)		(%)
GAMBIA	170 000	1981	not available
SENEGAL	1 400 000	1981	63.7
MALI	1 050 000	1977	86.7
BURKINA FASO	740 000	1980	84
IVORY COAST	1 165 000	1980	46.1
NIGER	680 000	1982	80.5

Table 1: Consumption of wood and charcoal in the six countries belonging to CRES.

Wastes of animal origin and household wastes

The energetic exploitation of these resources is possible using several techniques:

- direct combustion in small-scale or industrial ovens or boilers;
- methane fermentation in bio-digesters.

Although livestock rearing is widely practised in the Sahelian countries of West Africa, the recovery of animal wastes is confronted by serious obstacles:

- There is a significant cattle population throughout the Sahel but the collection of cow dung is difficult because of the nomadic lifestyle of many herdsmen. Mali, for example, with five million cattle and 12 million sheep and goats could in theory produce 200,000 tpe in the form of biogas; but only a small fraction of this potential is easily recoverable, in practice 20,000 tpe from the 20,000 plough oxen kept in sheds.
- Abattoirs could supply an appreciable contribution of bio-energy.
- Urban waste (household rubbish, brewery draff, etc.) can be exploited by combustion or fermentation in small thermal power stations.

Agricultural by-products and wastes

Arising from forestry and farming, these represent an enormous potential which is still unexploited or poorly exploited for lack of a system for collecting this biomass and the appropriate equipment (gas generators and "dual-fuel" engines, biodigesters).

COUNTRY	NATIONAL POTENTIAL IN TPE/YEAR	YEAR	SOURCES OF ESTIMATE
GAMBIA	Not available		
SENEGAL	Not available		
MALI	1 320 000	1984	TRANS-ENERGY Study
BURKINA FASO	670 000	1984	CRES Report
IVORY COAST	6 000 000	1982	" "
NIGER	1 610 000	1982	" "
MAURITANIA	Not available		
CAPE VERDE	Not available		

Table 2: Energy potential of vegetable residues in Member States of CRES.

Except in Ivory Coast (where 4 million tpe are producible through the exploitation of forests), this energy potential comes mainly from food crops (millet, sorghum, maize, rice) and industrial crops (cotton, ground-nuts).

It should however be noted that one of the common alternative uses of agricultural by-products is as animal fodder (cereal straw, ground nut and cotton-seed cake, etc. ...) which somewhat limits the availability of these resources for energy purposes.

Solar energy

As a result of its situation within the tropics, West Africa enjoys excellent insolation (4.5 to 6.5 kwh/m^2/day, i.e. an annual mean of 5.5 kwh/m^2/day) which in theory would be sufficient amply to cover its total energy needs.

Indeed, it is possible, for example, to make an approximate estimate of consumption in the six principal countries of the zone as follows:

COUNTRY	AREA km^2	OVERALL ENERGY CONSUMPTION (domestic + industrial + transport) tpe estimate for 1985
GAMBIA	10 000	200 000
SENEGAL	200 000	2 200 000
MALI	1 204 000	1 400 000
BURKINA FASO	274 000	900 000
IVORY COAST	320 000	2 600 000
NIGER	1 270 000	800 000

Table 3: Overall national energy consumption, representing a total of 8,100,000 tpe consumed over an area of approximately 3,400,000 km^2.

If one assumes a conversion yield of only 5 per cent for collected solar radiation and an equivalence of 4,000 kwh/per 1 tpe, it can be seen that solar generators (photovoltaic cells for example) with a surface area of:

$$\frac{8\ 100\ 000 \times 4\ 000}{0.05 \times 5.5 \times 365} = 323 \times 10^6\ m^2 = 323\ km^2$$

would be sufficient to produce all the energy currently required by the economies of the six countries, in other words less than 1/10,000th of their total area.

Wind energy

The exploitation of wind energy is a promising alternative for certain water needs in the country (market gardening, animal watering) and for the development of other income-generating artisanal activities (e.g. flour milling, river shipping etc.).

Zones with a high wind potential are:

- Cape Verde and certain other coastal fringes;
- The Sahel Strip, which is a cattle raising area.

Hydroelectricity

The hydroelectric potential in the region is considerable, being linked with the major hydrographic network of the big rivers and their tributaries: Niger, Senegal, Gambia, the Voltas, Cavally, Sassandra, Bandama, Comoé, etc.

By way of example,

- Mali has a capacity of 1,050 MW (1981 estimate);
- Ivory Coast could generate 7,100 GWh for a total capacity of 3,800 MW (1984 estimate).

On these figures, the dams built to date provide the following contributions:

COUNTRY	SITE	DATE OF ENTRY INTO OPERATION	WATERWAY CAPACITY	MW	GENERATION GWh/year
MALI	Félou		Senegal		2.7
	Manantali	1988 *	Bafing (Senegal)	150	
	Sotuba	1966	Niger	5.40	35
	Sélingué	1980	Sankarani (Niger)	45	180
IVORY COAST	Ayamé 1	1959	Bia		
	Ayamé 2	1965	Bia	50	200
	Kossou	1972	Bandama	174	500
	Taabo	1979	Bandama	210	1 000
	Buyo	1980	Sassandra	150	850

* Forecast.

Table 5: Current production of hydroelectric energy in Mali and Ivory Coast.

The poor supply of water experienced by the West African region for 15 years, far from hindering, has stimulated numerous studies aimed at better exploiting this hydroelectric potential, particularly in the form of micro and mini-generating stations on tributaries of major rivers and in mountainous regions with high rainfall (for example the Keniéba power station in Mali).

Other Renewable Energy Sources

(a) Animal traction: is already used to a limited extent in the transport of goods and people, agricultural traction (ploughing teams) and pastoral

irrigation (donkey and camel wheels), and could be further exploited in stock-rearing zones. It could effectively replace human muscular energy which unfortunately remains the principal form of energy available to many farmers throughout West Africa.

The tasks of drawing water and carrying loads, which are often performed exclusively by women and children, should as a matter of priority be dealt with in this context.

(b) Geothermal energy: Geothermal potential is very little known in West Africa and is probably of insignificant volume.

3.2. State of technologies and applications of renewable energy

Taking each area of application in turn, we shall examine the most advanced technologies able to satisfy the energy needs of developing countries. There is a wide range of prototypes and equipment at the experimental stage. We shall place particular emphasis on the most reliable of these which are ready for wide utilization.

3.2.1. Energy techniques for the exploitation of biomass

Energy resources from biomass can be divided into:

- wood and charcoal
- liquid and gaseous fuels

3.2.1.1. Wood and charcoal

Nearly all energy consumed in rural areas and in the poor quarters of African towns for domestic purposes and cooking is supplied by wood. Unfortunately, forest reserves are being used up more rapidly than they are being replaced. That is why most large African towns, particularly in the Sahelian zone, are experiencing a real firewood shortage. In the countryside, villagers go further and further in search of wood, often requiring half a day's or a whole day's journey on foot.

The effort to combat desertification involves:

- a vast reafforestation campaign, particularly through village plantations
- more efficient use of wood as a source of energy.

In Africa it would be necessary to replant several million hectares in order to satisfy the demand for firewood. This is a long-term, but essential, enterprise. Several forestry projects are in progress or being launched.

In the short and medium term, simple technologies to make more efficient use of the available firewood resources must be developed.

(a) Improved stoves

For cooking food and domestic uses, the traditional open hearth with three stones is used almost everywhere in African country areas and in the populous districts of towns. This type of hearth only uses a very small part of the energy of the wood which is burned. By burning the wood in an enclosed space and by controlling the circulation of air entering and leaving by use of a chimney, it is possible to "improve" to a massive extent the performance of the traditional hearth, which is then called "improved stove".

Depending on the type of material used for their construction, the various types of improved stoves can be divided into two categories:

- fixed stoves, in masonry, whether clay or a mixture of sand and clay to reduce cracking. The construction technique can be mastered by local craftsmen through short practical training courses. Particular attention must be paid to the design of the stove; "tomb"-shaped forms are rejected by some superstitious peoples, the height of the stove will be adjusted according to the standing or squatting position of the housewife, and so on. Clay stoves are cheap but lack strength.

- portable stoves, either metal or ceramic. The construction of these is easy for local craftsmen, particularly manufacturers of metal furnaces and potters. The case of moving them inside or outside the kitchen and their low cost are major advantages.

Having been told that a firewood saving of up to 50% could be achieved, several women's organizations launched campaigns for building improved stoves. Experience subsequently showed that this saving had been somewhat over-estimated, but the operation nevertheless resulted in a saving of money for the urban housewife and a saving in time for the countrywoman. Further efforts are required to achieve a greater distribution of improved stoves.

Despite the absence of precise statistical data, it can be stated that several thousand improved stoves are in operation.

It appears that the enthusiasm which dominated the publicity campaigns for the use of improved stoves has subsequently flagged for a variety of reasons; for example, the real saving is probably less than 50%, there are numerous models and the choice between them is not easy for the uninformed user, difficulties connected with the use of local materials make it necessary to rely on inexperienced workmen whose remuneration may be beyond the means of a low-income household and the saving is of time but not of money in the country. There is evidence of a fairly clear preference for portable improved stoves, preferably metal, manufactured by local artisans. These portable stoves will certainly become more widespread, particularly in urban zones.

(b) Charcoal ovens:

The transformation of wood into charcoal involves a significant loss of energy. With a modern oven it is possible to obtain one ton of charcoal from 6 m^3 of wood, and only half this amount with a traditional oven.

There are several possibilities for improving charcoal manufacturing techniques. It is in urban zones particularly that households use charcoal, thanks to portable metal stoves currently manufactured by local artisans.

3.2.1.2. Liquid and gaseous fuels from biomass

(a) Motor spirit

Ethanol or ethyl alcohol, produced by the fermentation and distillation of molasses from sugar cane or sugar beet is used as a motor spirit either in its pure state or mixed with petrol. In Brazil the majority of vehicles use this mixture which is called gasohol and contains up to 20% alcohol. In Mali, a country which is landlocked and an importer of oil, the implementation of a project for mixing petrol with 3% alcohol is economically justified by the existence of two sugar refineries and the lack of a market for the alcohol produced by the two distilleries. Experiments have been carried out in Mali on the direct use of the alcohol produced by these distilleries in agricultural tractor engines.

In order to avoid major modifications to the engine, some experts consider that the alcohol petrol ratio should not exceed 15 to 20 per cent alcohol.

The distillation of wood produces methanol or methyl alcohol which presents problems when mixed with petrol and can therefore not be used as motor fuel.

(b) Biogas

Anaerobic decomposition of animal, vegetable and human wastes produces a gaseous mixture containing 55 to 65 per cent methane which can be used as a motor fuel. The mixture of water and organic substances is done in a digester. The gas produced is collected in the upper part of the digester and extracted through a pipe to power a refrigerator, lights, gas cooker, the motor of a cereal mill, etc. according to the capacity of the digester. In addition, the residual materials from the digester are recovered and used as soil fertilizer.

China and India are the two great pioneers of biogas techniques and have developed large-scale programmes: there are more than 10 million family-sized digesters in China.

There are a number of conditions and difficulties affecting the wider use of digesters: permanent availability of water and particularly animal or human wastes in sufficient quantity, the skills required in the construction of the digester, care in the handling of the gas, factors such as bacteria, temperature, acidity and others influencing the chemical reaction, the presence in the gas of small quantities of hydrogen sulphide which attack the metal components etc. For these various reasons bio-digester technique is still at the experimental stage in most African countries.

Direct combustion of solid biomass such as wood, bagasse, rice chaff, ground-nut shells and so on provides a gas of low calorific power which can be burned in the boilers of small power stations. When residues exist, plants can use them to produce steam and/or electricity for their own needs. In Mali, some rice plantations of the Niger Office are supplied with electricity by a low-grade gas generating plant of 300 KW.

3.2.2. Technologies making direct use of solar, wind and water power

Techniques making direct use of solar, wind and water energy are really very old; drying fish, windmills and watermills etc. Thanks to research efforts in specialized laboratories and institutes in industrialized and developing countries, new and more suitable equipment with better performance has been developed and tested on site.

3.2.2.1. Applications of solar energy

3.2.2.1.1 Heliothermal applications

(a) Solar water heaters

Water heating by solar energy retained by collector panels is probably the first application in developing countries, including West Africa. The technology of these water heaters is now sufficiently well mastered and there are manufacturing plants in Senegal (SINAES), Niger (ONERSOL) and Mali (Solar Energy Laboratory). The water heater is a product that is both technically mature and economically and commercially ready for distribution. The manufacture of water heaters is still low in volume (some hundreds of units produced to date).

However it appears that in countries enjoying good insolation the heating of water is not regarded as a priority need. The cost of heating water is generally a minor part of the household budget. The use of water heaters therefore is likely to be limited to urban zones because of the cost. The marketing of the product is confronted with cost and technical quality problems.

(b) Solar stills

Solar stills are used to produce distilled water for use for example in hospitals and motor electrics workshops (battery electrolyte). There is a considerable potential market for the still, hence the interest shown by several countries in West Africa, including Mali, Mauritania, Niger and Senegal.

(c) Solar driers and cookers

The use of solar energy for drying, preferably in an enclosed space rather than in the open air, of fruit, vegetables, cereal, tobacco, fish and so on is common in several African countries with an agricultural base. Drying is a good method of preservation but can change the taste of the commodity, as in the case of fish. The lack of a means of regulating the temperature is one of the difficulties encountered. Solar drying can nevertheless be of interest for an agricultural or fishing co-operative.

With regard to solar cookers, it is difficult to adapt them to the habits of housewives who prefer improved stoves for cooking food. Like solar dryers, this is a technology at the experimental stage.

3.2.2.1.2. Photovoltaic applications

Solar energy is converted into electricity by means of silicon-based photovoltaic cells. Photovoltaic solar energy is particularly competitive in supplying small-scale power needs in isolated sites, particularly the pumping of water in rural zones, telecommunications relay, navigation beacons and buoys, electricity supply to rural dispensaries and so on.

The relatively high investment cost of photovoltaic solar generators is offset by zero operating charges and negligible maintenance.

In the medium term and if the cost of cells falls, the photovoltaic solar generator will play a predominant role in small-scale power applications at isolated sites.

(a) Photovoltaic solar pumps

In the context of village and pastoral water supply programmes, a substantial number of photovoltaic pumping stations have been installed in Mali (about 70 units), Senegal, Burkina Faso (about 15) and Niger, and in general the equipment is reliable and satisfactory in operation.

Moreover the Member States of WAEC, in their national renewable energy equipment programmes, envisage more or less intensive progress in installing new photovoltaic pumping stations ranging from 0.5 to 5 KWc power rating. The CRES regional programme gives the following picture:

COUNTRY	FORECAST INSTALLATION OF PHOTOVOLTAIC PUMPS NUMBER	AGGREGATE POWER IN KWc *
Gambia	Not available	Not available
Cape Verde	Not available	Not available
Senegal	30	115
Mali	260	716
Burkina Faso	41	150
Ivory Coast	239	422
Niger	Not available	Not available
Total	738 pumps	1 403 KWc *

* KWc=kilowatt-photovoltaic peak.

Table 4: CRES regional programme for installation of photovoltaic pumps over 5 years.

It should finally be noted that in Mali the tendency is to install photovoltaic pumps at certain large flow developing market gardening in order to obtain a profitable return on the investment.

(b) Various microelectrifications

Photovoltaic cells have effectively replaced classical electrical generators (diesel or petrol sets, dry batteries, etc.) in numerous low-grade power installations (a few watts to a few thousand watts) for the following applications:

- Lighting, refrigeration and ventilation of public establishments such as, in Mali, the hospitals at San and Kolokani and schools at Kimparan, Somo, etc.
- Telecommunications and radio
- Rail and air transport signalling.

In the latter two applications in particular, the reliability and quality of service make photovoltaic energy much to be preferred.

3.2.2.2. Wind Energy

For a very long time wind power has been used in countries enjoying regular and strong winds for pumping water and milling of cereals.

There are various types of windmill, varying in height, diameter and number of blades. The multiblade windmill which turns at a wind speed of 3 m/sec or above is the most widespread model in rural areas.

Windmill output depends on the characteristics of the prevailing wind but the available data on sites are insufficient and not very reliable. The components of high power windmills are imported from developed countries and assembled on site. Small multiblade windmills can be manufactured on site with locally recycled materials. An interesting experiment is that carried out at the Training Centre for Rural Artisans at Segou, Mali. Father Plasteig, Director of the Centre, takes in young peasants, gives them the necessary training and assists them in building their own windpumps of the Sahores type with components of bamboo, rubber and recycled parts. At the end of the training, the trainee returns to his village taking a complete windpump in kit form, which he can easily assemble over a well and then maintain. Some 50 windpumps have been built in this manner to date. The main application of the windmill is the pumping of water in pastoral areas. In about 1950, Mali installed some 30 windmills (Came and Aermotor types) in the north and eastern regions. All these windmills are now out of action owing to lack of maintenance.

In West Africa, Cape Verde, which enjoys a very favourable situation with regard to winds, is developing a major national programme for the installation of windmills. Some windmill installations are anticipated in Senegal, Burkina Faso and Mali.

More recently, prototype windgenerators for converting wind energy into electrical energy have made their appearance on the market. Apart from the high cost, a number of problems remain to be resolved.

The power output of the windgenerator should not be less than 15 KW.

3.2.2.3. Waterpowered microgenerating stations

Like the windmill, the waterwheel has long been used for grinding grain and raising water. If there is an appropriate site, it is still a simple and robust technology which can be used to produce energy.

The water turbine has a much better performance than the waterwheel.

Water-powered microgenerating stations are electricity generators (turbine-alternator) whose power varies in general between 5 and 50 KW. Several thousand water-powered microgenerating stations are operational in China.

The water-powered microgenerating station solution should be considered if the following conditions are present:

- the site has suitable characteristics, notably the availability of a permanent flow and adequate fall, and a minimum investment cost in terms of civil engineering.

- proximity to consumption centre in order to avoid the high cost and power loss on a long transmission line.

In order to advance knowledge on the potential for water-powered microgenerating stations, several African countries have undertaken study programmes and inventories of sites. These projects are in progress.

Countries lacking high relief and whose waterways are irregular in flow are little suited to the installation of water-powered microgenerators.

3.2.4. Investment cost and economic comparison with classic equipment

It is premature to draw definitive conclusions regarding the investment costs and economic viability of renewable energy projects because experience in the field

of applications is quite recent and there are still few examples. As long as the equipment is not mass produced to satisfy the needs of a major market, its cost will remain relatively high.

As an example, an appreciable lowering of the cost of photovoltaic cells had been expected. Unfortunately prices have remained static or with only a slight downward trend.

In the annex, we offer case studies in Mali:

(1) Economic comparison of a solar water heater and an electric water heater at Bamako (Annex 1).

The solar water heater is twice as cheap as the electric water heater.

(2) Comparative cost per m^3 of diesel pumps and photovoltaic solar pumps (end 1983) (Annex 2).

(3) Estimated operating costs (costs of output achieved) by type (Annex 3).

The following conclusion can be drawn: for the four areas of application listed below renewable energy equipment is competitive:

- heat production: water heating
- pumping: photovoltaic solar energy or wind energy
- electric energy for isolated sites: photovoltaic generators up to 10 KWh/day approximately
- electricity generating stations of 50 KW and more: gas generators.

Finally, as a general rule, investment costs for renewable energy equipment are relatively high compared with equipment of the classic type but on the other hand recurring charges are markedly lower.

3.2.5. Possibilities for local manufacture of renewable energy equipment

The possibilities of local manufacture of components or complete renewable energy equipment depend:

- on the choice of the range of products capable of being manufactured on site,
- and to a great extent on the size of the market.

Before taking any decision on the local manufacture of particular equipment it is necessary to carry out a feasibility study on industrial production with a detailed and in-depth analysis of the market. The exiguity of the market in developing countries is quite common, particularly for new products such as renewable energy equipment. Regional or subregional co-operation is highly desirable in order to obtain a market of sufficient size. That is why CRES envisaged the creation of the UPS (System Production Unit) at Member State level.

It is also necessary to distinguish between equipment to be manufactured at national level and subregional level. At national level, industrial production must be based on existing units which are usually small- or medium-sized enterprises or artisanal workshops.

The market evaluation must be based on reliable data. It can be made easier if States have national short- and medium-term equipment programmes, as is the case with most of the Member States of CRES.

Taking account of certain criteria such as in particular the level of technological maturity, cost, priority accorded to the areas of application and acceptability to users, it is possible to base a programme of local manufacture in West African countries on the one hand on items selected by CRES and on the other on:

- assembly and encapsulation of photovoltaic cells in modules
- certain components of the windgenerator (blades, mast)
- assembly of components of photovoltaic generators.

An encapsulation unit is only viable at subregional levels.

A feasibility study in Mali on an industrial production unit for solar equipment carried out in December 1984 by UNIDO showed the interest of a unit with an annual production capacity of 185 water heaters, 70 windmills, 10 stills, 5 dryers and 25 supports, frames, etc. However, the economic and financial profitability would be low mainly because of the small size of the market in Mali.

That is why, for the West African subregion, an industrial infrastructure comprising a subregional industrial unit (such as the UPS of CRES) and small national artisanal units seems to us more realistic.

4. FACTORS AND CONSTRAINTS LIMITING THE DEVELOPMENT OF RENEWABLE ENERGY SOURCES

Despite the encouraging results obtained since the informing of international opinion by the United Nations Conference on new and renewable energy sources, numerous and varied constraints limit the development of applications of renewable sources of energy. Countries having potentially important and renewable energy resources must take the necessary measures to do away with these barriers and intensify their efforts to distribute and market products which are technically proven.

4.1. Technical constraints

The analysis of resources has shown the lack of available data and the absence of an inventory. This missing knowledge of resources explains why some governments in developing countries have not been in a position to define the role and place of renewable energy in their economic and social development plans.

Information on possible applications of renewable energy sources, the cost of various types of equipment, the advantages and drawbacks compared with conventional equipment is still scarce in some countries. This explains why there is a widespread view in these countries that such equipment is still experimental, sophisticated and high in investment cost.

With regard to technical maturity, some renewable energy equipment has become very reliable. This is particularly so in Mali with photovoltaic pumping installations: experience has shown pump faults but very few generator faults. The nine products selected by CRES are technically mature and viable. On the other hand, other equipment is at the experimental stage.

The absence of a technological environment is also a handicap in developing countries, limiting local replacement of faulty parts.

4.2. Financial constraints

The very low national incomes of developing countries prevent them from allocating the large financial resources required to implement equipment programmes. CRES for example estimates that its five-year regional programme (8 countries) will cost approximately 51 billion CFA francs of which 38.4 billion CFA francs are for equipment as such and 7.9 billion CFA francs for related work.

The involvement of foreign investors is essential to finance these investment programmes. The equipment investment costs are relatively high. Maintenance costs on the other hand are very low, which makes it easy for users in rural zones to accept them.

Investment in collective equipment is financed by the Government with the aid of investors. Recurrent maintenance costs are borne by users or local organizations. In rare cases (photovoltaic pumps installed in the region of San in Mali under the Mali Aqua Viva project directed by Father Vespieren), rural communities also make a contribution of 10 per cent to the investment cost.

4.3. Institutional constraints

At the institutional level the renewable energy sources sector is characterized in most developing countries by the multiplicity of the bodies involved and belonging to different supervising departments. The circulation of information is thus blocked and there is a lack of co-ordination and coherence in programmes of activities.

In some countries, it is essential and a matter of urgency to define an overall policy for energy including renewable energy sources. It is necessary to strengthen the bodies responsible for renewable energy planning. It is also necessary to specialize the fields of activity of existing bodies or set up, with specific areas of competence, research and development, engineering, installation and maintenance and industrial production departments. The creation of a co-ordinating centre or body is an absolute priority.

Finally, for community installations, a local structure with proper management responsible for the maintenance of the installations must be created at village level.

4.4. Weakness of human resources

The majority of developing countries do not have specialists in the various areas of renewable energy sources. There are few professionals in research, design and implementation. Where they are available, they are handicapped by lack of experience.

States will remain dependent on technical assistance for as long as they fail to take the urgent and vigorous measures required to train competent specialist professionals.

4.5. Sociological constraints

The acceptance of renewable energy equipment by the rural populations concerned is a priority target. The design and use of this equipment must not challenge cultural values and certain ancestral traditions.

Only a continuing process of information, promotion and the arousing of awareness regarding new technologies, with technical follow-up and management assistance, can lead progressively to a massive adoption by populations of renewable energy equipment. This is an essential condition for the success of any popularization programme.

5. ACTIVITIES AND ROLE OF NGOs IN THE DEVELOPMENT OF RENEWABLE ENERGY SOURCES

Renewable energy is aimed at satisfying small-scale decentralized energy needs in rural zones in Africa and the developing countries. As a result of its major potential and its growing competitiveness, particularly in isolated sites, it is destined to become a key factor in rural development in developing countries.

One of the targets of NGOs is to contribute to the development of rural zones with limited means and by using all local resources (human, agricultural, pastoral, water), including energy resources such as biomass, waste of agricultural and animal origin etc. which make up the major part of renewable energy.

Confronted with the numerous possibilities offered by the applications of renewable energy sources in the rural environment, some NGOs have directed their attention to simple technologies, cheap and preferably using local materials, which are within reach of the country dweller. Their attitude is more reserved when it is a question of imported technology with sophisticated equipment which is very expensive and virtually inaccessible to the world of the peasant.

It is for this reason that NGOs have been particularly active in the field of applications of biomass: improved stoves, digesters.

5.1. Summary of NGO activities

Without surveys among NGOs, it is difficult to draw up a balance sheet of their activities in the field of renewable energy sources. We will confine ourselves to mentioning a few achievements.

Despite the absence of precise statistical data, several NGOs have contributed to the construction and distribution of improved stoves with the support, in most cases, of women's organizations whose role is vital for propaganda and promotion. The development and testing of prototypes and the improvement of performance are generally carried out by laboratories or specialized institutes.

There is a fairly clear trend in favour of portable improved stoves, preferably made of metal and manufactured by local artisans; these are destined to become widely distributed.

In several countries, NGOs, thanks to their local knowledge and a precious store of experience, have helped research institutions to define and test prototypes better adapted to socio-cultural conditions.

5.1. Biogas

The use of agricultural, agro-industrial and animal wastes to produce gas in a digester is a technology which has been recently introduced in Africa thanks to the experience of certain developing countries, notably India and China. In several African countries, NGOs, alone or in collaboration with specialized institutions, have designed, built and tested digesters with a preference for sites where concentrated waste was available in sufficient quantity.

Experiments with digesters have shown up certain obstacles: the need for regular supplies of waste and of water, careful construction and sound engineering in particular, leak-tight digesters and gas piping, safety precautions in the handling of the gas etc.

In order to ensure widespread diffusion of digesters there is a need to intensify the information and awareness campaign among rural populations in Africa who, historically, have little experience in the use and handling of gas as a source of energy.

Action by NGOs can contribute to overcoming this obstacle, which is of a socio-cultural nature. It will then be possible to launch major programmes for the distribution of small family-size digesters, as in China.

5.1.2. Windpumps

Windpumps are generally wholly imported and rarely manufactured on site in most African countries. In Mali, Father Plasteig's Training Centre for Rural Artisans at Segou is probably the only NGO in the subregion which manufactures windpumps.

Although they are concerned with the problem of pumping water, NGOs are not very active in the field of windpumps except in regions where wind conditions are exceptionally favourable.

5.1.3. Solar equipment

Here again it is a matter of wholly imported equipment, with a high investment cost but negligible maintenance charges. This explains the lack of interest shown by NGOs with their limited financial resources.

The energy crisis and the rise in the price of oil have increased the competitiveness of solar energy in the case of isolated sites lacking any energy source. Thus in Mali, two NGOs are working in the solar energy sector: Mali Aqua Viva directed by the "dynamic" Father Vespieren who is boring wells and equipping them either with pumps relying on human power or solar pumps. In its zone of operations, MAV has installed nearly 30 solar pumping stations.

Another NGO, "Iles de Paix", is operating in the Tombouctou (Timbuctu) region of Mali and has installed one or two solar pumping stations for irrigation.

It is common to hear complaints from NGOs that solar equipment is sophisticated and not very reliable. The experience acquired in Mali for 10 years past suggests that the new generation of solar generators shows good qualities of reliability. Moreover, the solar generator is composed of wholly static components without any sophisticated system for control, regulation or other functions.

5.1.4. Solar water heaters

The solar water heater, which is a technology that is easy to implement, is destined for major development particularly in the towns, which limits NGO involvement.

5.2. Possible NGO contributions to the development of renewable energy sources

For the reasons already mentioned, NGOs have generally not been very active in the field of applications of renewable energy; however, the progress achieved by new technologies, the growing interest among rural populations, particularly in improved stoves and photovoltaic solar pumping stations, should stimulate NGOs to take greater interest in the sector of renewable energy sources.

5.2.1. Intensification of NGO activities in priority areas of application

NGOs are involved in several countries in the construction of water-related (wells, bore-holes) and sanitary (rural dispensaries and maternity clinics) infrastructures. They can assist those rural populations which are interested in completing these facilities by:

- Photovoltaic solar pumping equipment and the development of market gardening,

- Supply of solar electricity to dispensaries and maternity clinics.

In general terms NGOs could intensify the activities in which they are currently involved and expand them in line with new possibilities.

5.2.2. Involvement in the socio-cultural aspect

The socio-cultural aspect of renewable energy projects, including promotion and propaganda, is a particularly important task. NGOs can make an appreciable contribution here.

5.2.3. Assistance in training and maintenance of equipment

NGOs can also assist rural communities in training local artisans in the maintenance and repair of community equipment. They can contribute assistance in the management of such facilities.

5.2.4. Collaboration between NGOs and bodies responsible for the renewable energy sector

This collaboration is essential in order to achieve better co-ordination of the activities of NGOs and those of State bodies. It also covers exchange of information, agreement on the choice of the most suitable technologies, organization of awareness campaigns and so on.

At the institutional level, NGOs should be represented in national co-ordination structures in the renewable energy sources sector.

5.2.5. NGO support to artisanal production units

NGOs can also assist local artisans in improving the technical and financial performance of renewable energy equipment. They can promote the setting up of small local artisanal units, particularly in the manufacture of metal or ceramic improved stoves, small charcoal ovens, etc.

5.2.6. Creation of specialized NGOs in the field of renewable energy sources

The growing interest in renewable energy sources may encourage specialization. Thus in several countries certain NGOs envisage specializing in certain priority applications of renewable energy. Similarly, the idea of setting up national NGOs for the development of certain forms of renewable energy has made considerable progress.

6. CONCLUSION

The energy crisis has given a new impetus to the development of renewable energy in developing countries, particularly those which have major biomass, solar energy and wind resources and which are importers of petroleum.

Renewable energy sources offer a variety of solutions which are technically and economicaliy viable in satisfying small-scale, dispersed energy needs in rural zones.

Renewable energy technologies have achieved remarkable progress. Some products have attained a sufficient degree of reliability and maturity for their distribution to be envisaged on the basis of industrial or artisanal production.

NGOs can play and important role in the development of renewable energy if steps are taken to involve them in co-ordination and planning activities in the energy sector.

ANNEX 1

WATER HEATING

CASE STUDY: ECONOMIC COMPARISON OF A SOLAR WATER HEATER AND AN ELECTRIC WATER HEATER AT BAMAKO

(Source: SEMA/AFME - updated 1984)

Location: Bamako

Overall minimum solar insolation: 3.7 kWh/m^2 (overcast sky in January)

Hot water requirements at 50° C (family of six people): 6 x 30 = 180 l/day

Cold water temperature: 25° C

Daily calorific requirements:

Q = m. t = 180 x (50-25) = 4,500 kcal/day or 5.23 kWh/day

Collector surface required with an output of 0.5:

Calorific energy collected: 3.7 x 0.5 = 1.85 kWh/m^2 collector/day

The requirement is therefore 5.23/1.85 = 2.83 m^2 of plane collectors.

Cost comparison on an annual basis:

	Solar water heater	Electric water heater
Investment cost	600 000 FM	300 000 FM
Amortization 10 years 10%	98 000 FM	45 000 FM
Electricity at 100 FM/kWh (output 0.9 *)		212 000 FM
Total annual expenditure	98 000 FM	261 000 FM
Cost per m^3 of hot water **	1 500 FM/m^3	4 000 FM/m^3

* Number of annual electric kilowatt/hours = 5.23/0.9 x 365 = 2,120 kWh per year.

** The cost should be slightly increased in order to allow for maintenance.

N.B. 100 Malian francs (FM) = 1 French franc (FF) = 50 CFA francs

ANNEX 2

COMPARATIVE COST PER CUBIC METRE OF DIESEL PUMPS AND PHOTOVOLTAIC SOLAR PUMPS (END 1983)

(Source: SEMA ENERGY/AFME) Value in French francs

	Diesel generator set + electric immersion pump	Photovoltaic pump with 1300 W peak	
Head of water	30 m	30 m	
Nominal flow	7 m^3/h	32 m^3/day	
Annual operating hours	1 800 hours	1 800 hours	
Annual volume pumped	12 600 m^3	11 500 m^3	
Investments (in FF) generator + pump + pump house	125 000		
Photovoltaic pump		270 000	
Annual amortization (in FF)	Life of 4-10 years	Life 10 years	15 years
with interest rate at 10%	24 900	43 900	36 000
Annual operating costs diesel fuel *, oil, labour, maintenance	37 600		
Periodic maintenance		8 000	8 000
Total annual cost	62 500	51 900	44 000
Cost per m^3 pumped	4.95 F/m^3	4.50 F/m^3	3.80 F/m^3
(excluding structural work and distribution)	(i.e. 495 FM/m^3)	(450 FM/m^3)	(380 FM/m^3)
including operating costs of	3.00 F/m^3	0.70 F/m^3	0.70 F/m^3

* Diesel fuel: 16,200 FF/year based on 6 FF/l (including storage cost); a second table is annexed assuming a price of diesel fuel of 4 FF/l (400 FM, excluding distribution and storage).

N.B. 1 French franc = 50 CFA francs.

ANNEX 3

ESTIMATED OPERATING COSTS (COSTS OF OUTPUT ACHIEVED) BY TYPE

(Source: Energy Planning, Annex IV, Trans Energy, January 1985)

Type and field of application	Investment cost * (useful life)	Production or output achieved	Cost/output achieved (amortization + operation)
Solar water heater	600 000 FM (10 years)	180 l/day at 50° C	1 500 FM/m^3
Solar still (1 m^2)	150 000 FM (10 years)	3-4 l of distilled water/day	20 FM/l
Photovoltaic solar pump 1,300 W peak	27 000 000 FM (15 years)	32 m^3/day at 30 m	300-400 FM/m^3 (including 70 FM operating cost)
Wind generator for pumping (average wind speed 5 m/s)	14 800 000 FM (10 years)	40 m^3/day at 30 m	200 FM/m^3
"Sahores" type windpump, (Plasteig) (average wind speed 3 m/s)	450 000 FM (3 years)	6 m^3/day at 15 m (equivalent to 3 m^3/day at 30 m)	197 FM/m^3
Photovoltaic electricity generators (100 W peak or 10 W constant)	1 500 000 FM (15 years)	250 Wh/day	2.5 FM/Wh
Photovoltaic lighting kit (33 W peak - 4 fluorescent tubes)	600 000 FM (15 years)	4 x 3 h/day of lighting	230 FM/day
Photovoltaic refrigerator (60 + 15 l)	1 500 000 FM (15 years)	Conservation of food and/or pharmaceutical products	500 FM/day
Biogas digester (6 m^3, continuous operation)	450 000 FM (10 years)	3 m^3/day at 60% CH4	100 FM/m^3
Gas generator and electricity generating set (300 kW)	100 000 000 FM** (10 years)	2 000 kWh/day	60 FM/kWh **

* Investment costs including equipment and installation.

** Data to be confirmed.

N.B. 100 Malian francs (FM) = 1 French franc = 50 CFA francs.

1. Introduction

Co-operation between organizations within the United Nations system and non-governmental organizations has its legal basis in the provisions contained in article 71 of the United Nations Charter, adopted in 1945, dealing with arrangements for co-operation with non-governmental organizations. These have since been supplemented by other legal instruments of the United Nations. Within the spirit of this article the specialized agencies and other institutions in the United Nations system have drawn up procedures for co-operation with NGOs which are more suited to their particular requirements.

2. Legal instrument

As far as UNIDO is concerned, it is paragraph 36 of General Assembly resolution 2152 (XXI) dealing with its establishment and its operating rules and procedures which constitutes the legal basis of the provisions governing its relations with NGOs. At its first session the Industrial Development Board requested the UNIDO secretariat to prepare, for its second session in 1968, a document on the procedures to be followed to grant international NGOs the status of observers, based on the experience of other specialized agencies and institutions within the United Nations system.

As a result the UNIDO secretariat contacted a number of agencies and other institutions such as the Economic and Social Council (ECOSOC), the International Labour Organisation (ILO), the United Nations Food and Agriculture Organization (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO), the International Atomic Energy Agency (IAEA) and the International Bank for Reconstruction and Development (IBRD) in order to gather as much information as possible on the regulations governing their relations with NGOs. The document prepared by the secretariat covered:

(a) Functions, composition and terms of reference of an ad hoc committee of the Board on relations with NGOs;

(b) Criteria for the granting of consultative status to international NGOs;

(c) Procedure to be followed and information to be submitted with candidatures for consultative status; and

(d) Duties and obligations of international NGOs granted this status. From this document which was adopted in 1968 at the second session of the Board, it is particularly noteworthy that:

i. Unlike some agencies and institutions of the United Nations, such as FAO, UNESCO, ILO and ECOSOC which had two or three types of relations with NGOs, or the IBRD which dealt with the matter on an ad hoc basis, UNIDO was to recognize only one category of NGO;

ii. The international character of the NGO which applies for observer status must be established; and

iii. International NGOs wishing to be granted this status must be involved in industrial development, as recommended in paragraph 36 of resolution 2152 (XXI) of the General Assembly. 1/

1/ Document A 7215 IV.

3. Institutional instrument

At the institutional level and in order better to underline the interest attaching to co-operation with NGOs, the Section for co-operation with these organizations was created in January 1976. This Section is responsible for mobilizing and channelling the technological, management and financial resources which NGOs, enterprises and industrial institutions have available into the industrial process of developing countries. These organizations include the following institutions, both in the public and private sectors: international, regional, subregional and interregional NGOs.

The Section accomplishes this task by identifying resources which NGOs have available by establishing co-operation agreements, informing them of the needs of developing countries in order to encourage them to respond by mobilizing adequate resources in order to formulate and implement specific projects either jointly with UNIDO, or alone, or with other governmental or non-governmental organizations. This Section now has a Chief at level P-5, four Professional staff of a lower grade and four General Service personnel.

4. Areas of co-operation with NGOs

The number and diversity of NGOs covers all areas in which UNIDO is competent. Through their members they dispose of a vast human, technological and logistical potential which they wish to make available to developing countries. It is the duty of UNIDO to assist developing countries in gaining access to this potential and it is for NGOs to satisfy this aspiration. That is why UNIDO is anxious to increase the volume while endeavouring also to improve the quality of the assistance offered to these countries by drawing on the technical, financial, administrative and human resources available to NGOs in both developed and developing countries. These efforts have led to the identification, formulation and implementation of many technical co-operation activities to the benefit of Third World countries. Indeed a large part of the activities of UNIDO as a whole is directed to assisting developing countries in the establishment or strengthening of NGOs within the context of the organization's regular programme of co-operation with these countries. It is well known that the existence of NGOs in certain industrial sectors or subsectors in a country or in a region depends on the level of development attained by the country or region concerned. Developing countries are endeavouring to fill the gap created by the lack of NGOs in these sectors or subsectors by setting up governmental and intergovernmental organizations with the help of international organizations or through bilateral co-operation. Taking the term NGO in its broadest sense, the areas of co-operation between UNIDO and NGOs covers almost all UNIDO's activities. Whenever for example UNIDO assists an enterprise to improve its productivity, or contributes to the creation or strengthening of a research and development institution, a national organization for quality control, metrology and standardization, a promotion agency for small or medium-sized enterprises or rural industrialization, a chamber of commerce and industry, any kind of industrial institution, or an industrial co-operative, it can be considered to be co-operating with an NGO, even though the request for assistance may have been submitted through Government channels and the offices of Resident Representatives of the United Nations Development Programme.

The areas of co-operation which will be covered in this document will only concern the most salient aspects of co-operation with NGOs through the Non-governmental Organizations Section and their participation in certain special UNIDO programmes.

4.1 Establishment of NGOs

The establishment and operation of an NGO call for considerable human and material resources, something which for certain types of NGO and in certain regions such as Africa is only possible on the basis of international co-operation. And yet the importance of these organizations in the industrialization of developing countries has been stressed on several occasions. The Lima Plan of Action encourages developing countries to adopt industrialization policies designed to develop and strengthen public, financial and other types of institution and to give due attention to industrial co-operatives as means of mobilizing the local human, natural and financial resources for the achievement of the objectives of economic growth and social development. 2/

As far as the Lagos Plan of Action is concerned, this recommends the creation and strengthening of scientific and technological associations and societies and the establishment of co-operative links at regional level and with other similar organizations in order to facilitate the circulation and exchange of information in all fields of socio-economic development. 3/ That is why UNIDO encourages and contributes to the creation of subregional and regional sectorial associations whose aim is to mobilize local resources in key areas both in the sphere of industrialization and in economic and social development in general, such as worker training and development, pharmaceutical industries, fertilizer industries and cement industries. Wherever possible these activities are undertaken with existing organizations in these sectors.

As examples of activities in this field, in Africa and the Arab world one may point to the assistance provided to the Arab Federation of Chemical Fertilizer Producers, in conjunction with the United Nations Food and Agriculture Organization (FAO) and the Arab Organization for Industrial Development in order to strengthen its operational resources in the field of disseminating and processing information and in supplying technical assistance to some of its members. After taking part in the creation of the African Cement Manufacturers Association (CIMAFRIQUE), in the context of the Industrial Development Decade for Africa (IDDA), which placed particular emphasis on the development of the building materials industry, UNIDO has continued to provide assistance to this organization to allow it to intensify co-operation between its members in personnel training and research into special methods of testing cement adapted to tropical climatic conditions.

4.2 Promotion of co-operation between NGOs

The promotion of co-operation among NGOs is undertaken either through the UNIDO regular programme of assistance to developing countries, that is with the involvement of the governments of the countries concerned, or through ad hoc projects directly identified and implemented in co-operation with NGOs. This has a

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2/ Lima Declaration and Plan of Action on Industrial Development and Co-operation adopted by the Second General Conference of UNIDO, Lima, Peru, 12-26 March 1975, para. 58 (g) and (i).

3/ Organization of African Unity, Lagos Plan of Action for the Economic Develoment of Africa, 1980-2000, adopted by the Second Extraordinary Session of Heads of State and of Government of the OAU, devoted to the economic problems of Africa, Lagos, Nigeria, 28 - 30 April 1980, paragaph 154 (c).

certain specific importance in the domain of the co-operative movement and in the basic and advanced training of personnel in Africa. Thus, in co-operation with the International Co-operative Alliance (ICA) and the Joint Committee for the Promotion of Aid to Co-operatives (COPAC), the International Committee for Artisanal Societies and Workers' Production Co-operatives, national co-operatives in certain European countries such as Poland, Bulgaria, Sweden and certain governments of donor countries such as Italy, UNIDO's activity is aimed at developing the spirit of the co-operative movement by organizing seminars or by promoting the participation of national personnel cadres in international meetings of a technical nature.

In the spirit of recommendation 272 of the New Delhi Declaration and Plan of Action, which invited the UNIDO secretariat to encourage and strengthen national, regional and inter-regional training institutions in developing countries, the transfer of certain training facilities in production management techniques developed by the University of Louvain (Belgium) to the School of Economic and Commerical Science of the University of Douala (Cameroon) is an interesting example of co-operation between NGOs. The two institutions co-operated within the framework of a four-year programme which entered its implementation phase in 1981 and which involved the joint organization of training seminars in Douala and courses for Cameroonian teachers at the University of Louvain. From 1984 the University of Douala is taking over virtually full responsibility for the project. In addition, co-operation programmes in key scientific areas such as R and D and biotechnology have been developed between other institutions. The Centre for Biotechnology at Lorena (Brazil) and the University of Munich (Federal Republic of Germany) have carried out pilot studies and joint research into cloning of cellulose genes; the University of Dublin (Ireland) and the University of the Punjab (Pakistan) have co-operated on the subject of high cellulose-producing yeast species; the Kuwait Institute of Scientific Research and the University of Illinois (United States of America) are to undertake joint research on the enhanced production of single-cell protein using genetic engineering techniques 4/.

Enterprise-to-enterprise co-operation, investment promotion, the System of Consultations and the Technology Programme which will be considered later also offer a number of possibilities of co-operation between NGOs.

4.3 Establishment of co-operative links between universities and training centres and industry

Bearing in mind that in all countries universities and training centres constitute an important reservoir of both theoretical and practical knowledge which it would be a pity to isolate from the world of production, UNIDO is anxious to develop integrated programmes of industrial consultation with universities and training centres designed to provide entrepreneurs who need it with assistance in the field of the setting up and management of enterprises. UNIDO has just published a document in English and French on this subject, reference UNIDO/PC.15, which is available to all organizations on request.

In the African region this programme was launched in Mauritius, where a UNIDO mission was to evaluate the needs of the manufacturing sector with a view to setting up a consultative group responsible for assisting industrial enterprises in solving their management problems.

4/ Annual Report of the Executive Director 1984, page 158, paragraph 87.

4.4 Use of industrial fairs for the transfer of technologies

Industrial fairs offer a unique opportunity to see products manufactured using the latest technologies in each industrial sector and to establish contacts between producers and potential customers or bring about co-operation agreements between partners operating in the same sector. In response, on the one hand, to the interest of exhibition organizers in having the participation of qualified people from developing countries and, on the other, in order to provide assistance to the latter, UNIDO has developed a programme for using fairs as a means of promoting the transfer of technologies to developing countries. This programme hinges on three features: the sponsoring of participation by officials responsible for industrialization at various levels in developing countries, maintenance of a stand designed to publicize UNIDO's activities, and the organization of special seminars during the fairs combined with factory visits during which useful information on manufacturing techniques and processes are given to participants, thus creating a propitious climate for concluding co-operation agreements.

During 1984, UNIDO took part in the International Foundry Fair "GIFA 84" in Düsseldorf (Federal Republic of Germany), the Poznan International Fair (Poland) and the Twenty-Sixth International Fair of the Mechanical Engineering Industry in Brno (Czechoslovakia). The practical interest of the results achieved and the relatively modest level of the costs involved encouraged UNIDO to draw up a long-term programme for its participation in the major industrial fairs.

For example it can be pointed out that during the course of "GIFA 84" the UNIDO Information Stand dealt with some 600 requests for information and held 60 specific consultations, and also organized a foundry seminar for presentation of the UNIDO technical co-operation programme. A study tour including visits to foundry and metallurgical plants in the vicinity was organized for six engineers from Angola, Morocco, Nepal, Somalia and the United Republic of Tanzania, by courtesy of the Fair's management. 5/

4.5 Exchange of views and knowledge

This consists of an exchange of documentation and direct contacts between UNIDO and NGOs through correspondence, visits or participation in conferences, symposia, seminars and internal specialized workshops and meetings organized by one or the other. In 1984, UNIDO received 115 invitations to take part in this type of event, but unfortunately its limited resources enabled it to send representatives to only a very limited number. NGOs for their part constantly participate and support meetings organized by UNIDO. In the context of the preparations for the Fourth General Conference, which took place in August 1984 in Vienna, UNIDO held a forum of NGOs to discuss NGO contributions to the Conference. Representatives of industrial scientific and technical circles, the world of business and trade unions from 42 international and national NGOs took part. Prominent among the conclusions was the invitation to participants to support the Conference and take part in follow-up work in response to recommendations made by the latter. This is one of the reasons for organizing the current Forum. Another conclusion by this Forum was the convocation, aimed at NGOs, of a special round table on the occasion of UNIDO's conversion into a specialized agency in order to establish institutional machinery for co-operation with the new UNIDO and to strengthen the role of NGOs in the promotion of the interests and activities of the Organization.

5/ Report of the Executive Director 1984, Chapter II, para. 227, page 102.

Representatives of 33 international NGOs enjoying consultative status with UNIDO took part in the Fourth General Conference of UNIDO itself. This participation was unquestionably of value to the Conference in areas which neither UNIDO nor governments could have reached through their institutional channels of communication.

5. NGO participation in certain UNIDO special programmes

UNIDO special programmes in which co-operation with national or international NGOs deserves to be particularly emphasized are: the energy co-operation programme, the investment co-operation programme, the technology programme, co-operation between developing countries and the System of Consultations. UNIDO has developed many projects in the framework of these various programmes, to which NGOs of developing and of industrialized countries, or of a global nature, have made varying contributions.

5.1. Special energy programme

In order to contribute to the implementation of the Nairobi Programme of Action 6/ for the exploitation and use of new and renewable energy resources and to assist the Executive Director in co-ordinating and formulating policies and programmes concerning energy in general, a special advisory group on energy was set up within the Office of the Executive Director of UNIDO. Taking as a basis the study of internal documents and the reports of consultants, expert group meetings and international conferences, a policy for co-operation with developing countries in the energy field has developed, which UNIDO has followed in past years and which was confirmed by UNIDO IV, being particularly aimed at:

(a) establishing integrated planning of energy and industrial sectors in developing countries;

(b) encouraging the adoption of a policy aimed at achieving self-sufficiency in energy by exploiting local energy resources;

(c) increasing production of capital goods for the energy sector;

(d) ensuring better use of energy in industry, and studying suitable incentives for industry to attract undertakings to the vicinity of large hydro-electric dams. 7/

With respect to the development of new and renewable energy sources, UNIDO attaches particular importance to resources of hydro-electric power and biomass energy because they are in general everywhere abundant and seem the most likely to exercise a significant influence in the development of rural areas. Other forms of energy, such as geothermal energy and wind power can be of major importance to individual countries, but they are generally site-specific and unlikely to have a large impact on developing countries as a whole. 8/ As far as solar energy is concerned, its use in specific activities such as pumping water, salt production and fish drying has shown encouraging results, although its current domestic use is still restricted by technical problems (production, repair and maintenance of facilities and manufacture of spare parts etc.) and by financial constraints.

6/ Report of the United Nations Conference on New and Renewable Sources of Energy, Nairobi 10-21 August 1984 (Sales No. F.81.I.24).

7/ Report of the Executive Director of UNIDO 1983, page 129, para. 4.

8/ Report of the Executive Director of UNIDO 1983, page 129 and 130, para. 5.

In the field of the manufacture of capital goods required for the energy sector, co-operation projects are being developed with the most advanced developing countries. Many of these activities are being undertaken with the involvement of either national or international NGOs.

5.2 Investment co-operative programme

Of all the UNIDO special programmes the investment co-operative programme (ICP) is undoubtedly the one offering the greatest scope for collaboration with NGOs. Given that the fundamental activities of this programme consist of identifying, developing or reformulating, evaluating and promoting industrial projects, it concerns enterprises and entrepreneurs, national and international bodies for industrial promotion, financial institutions and so on. Through this programme, UNIDO endeavours to serve as an intermediary between the various partners, while protecting the interests of developing countries by helping mobilize resources where they are available (industry, governments and other NGOs) in order to channel them into the industrialization process of those countries. It gathers and disseminates information on projects and resources, undertakes training programmes for promoters of industrial projects and studies innovative investment-related arrangements including multilateral buy-back and leasing mechanisms or new forms of association between enterprises.

In order to accomplish this task UNIDO has, since 1976, been developing a network of investment promotion services which give enterprises and entrepreneurs, national promotion services, associations of entrepreneurs and others in developing countries access to opportunities for co-operation in host countries in the technical and managerial fields and for the mobilization of human and financial resources. These services, which are almost wholly financed by the host countries, are currently established in Cologne (Federal Republic of Germany), New York (United States of America), Paris (France), Tokyo (Japan), Warsaw (Poland) and Vienna (Austria). Negotiations aimed at setting up two new investment promotions services in Milan (Italy) and Seoul (Republic of Korea) are in progress.

This network is supported by a series of publications containing a large mass of information on several aspects of project promotion, in which NGOs play a predominant role:

(i) The Bank File consists of information on international, regional and national development finance institutions that may be willing to provide finance for industrial investment projects. The data given on each institution include the maximum and minimum lending limits, the term of its loans, its geographical area of activity, and the intended uses of the capital provided - study on preparation of projects, equity investment or the financing of projects in the private sector.

(ii) The Institution File is a directory of governmental and non-governmental institutions, such as ministries of industry, development corporations, investment promotion agencies, manufacturers' associations and chambers of commerce, that are, or could be, sources of industrial investment projects in developing countries. The basic information provided for each entry includes a classification of the institution according to type as well as the name of the officer responsible for investment promotion activities.

(iii) The Sponsor File is essentially a listing of firms in developing countries that may benefit from the redeployment of operational plants from industrialized countries. Data on redeployment possibilities from countries in which UNIDO has an Investment Promotion Service are transmitted to firms listed in the Sponsor File.

(iv) The Investor File contains information on public or private enterprises in some 40 industrialized and developing countries that are willing to participate in the implementation of industrial investment projects.

(v) The Project File contains information on investment projects communicated by national promotion services, industry associations, chambers of commerce and other NGOs engaged in the field of industrialization 9/.

These files are regularly updated and stored in the computerized Investment Promotion Information System (IMPRIS).

Another publication based on information mainly supplied by NGOs is the document "Proposals for Industrial Associations" (formerly called "Directory of Offers of Co-operation") which reached its seventh edition in 1984. It contains information on products, some 4,000, the manufacture of which can be undertaken in developing countries with the collaboration of potential partners. It has been sent to development corporations, investment promotion agencies, manufacturers' associations, chambers of commerce and other public and private bodies concerned with industrialization in developing countries.

NGOs also play a key role in information meetings and those for investment promotion organized at national level in developing countries. In the first type of meeting, representatives of public authorities and business circles in the countries concerned have the opportunity to inform representatives of banks, manufacturers associations and industrial federations of investment opportunities in their country and the advantages offered by the investment code. This type of meeting has been organized in several African countries, including Egypt, Kenya, Lesotho, Mauritius, Senegal, Tanzania, Zambia and Zimbabwe. Investment promotion meetings also offer NGOs the opportunity of collaborating with developing countries. In Africa they are organized either at country level or at sub-regional level. The Dakar Forum, which met in 1984 for the sixth time and which is of concern to all States Members of CEAO (West African Economic Community), brought together 252 African and 273 foreign participants, mainly from institutions which could be classed as NGOs. The discussions covered the promotion of 155 national and sub-regional investment projects 10/.

5.3 Technology programme

The activities of this programme are aimed at assisting developing countries to increase their scope for choice, acquisition, development of technologies, and adaptation of technological innovation. The importance attached to this programme was reiterated by the Fourth General Conference of UNIDO which set out the tasks to be undertaken by the organization in pursuing the objectives of the Vienna Programme of Action on Science and Technology for Development 11/.

9/ Report of the Executive Director, 1984, pages 170 and 171.

10/ (IDB Chapter V, para. 150.)

11/ Report of the United Nations Conference on Science and Technology for Development, Vienna 20-31 August 1979 (UN publication No. E.79.I.21 and Corrigenda Chapter VI.)

The main points are:

(i) to assist developing countries in the setting up of national groups to monitor and assess technological trends and technical groups or institutions in selected technological advances;

(ii) to continue to monitor world technology trends and the changing international technology market;

(iii) to promote technical training - particularly with regard to new technologies - and help developing countries in projects in new technological opportunities; to contribute to the creation of an international referral system for the identification of high-level scientists and technologists;

(iv) assist developing countries in making a survey of areas where needs could be met through the application of appropriate technologies, and encourage international co-operation in this regard;

(v) to assist in establishing more efficient institutional linkages in selected technologies, so that interested countries might identify any gaps in existing arrangements with a view to considering the setting up, where necessary, of national, regional and international centres for these technologies. 12/.

The implementation of this programme requires an active contribution by NGOs.

In the field of technology acquisition the activities of UNIDO are oriented towards creating or reinforcing R & D establishments or institutions responsible for evaluating technology imports under transfer of technology arrangement or for collecting data on techniques and contracts or towards promoting traditional technology. This technological information exchange system (TIES) which UNIDO has been developing for some years aims to promote and develop the exchange of information between services for the registration of technology transfer contracts by stimulating international co-operation. Co-operative activities between small- and medium-sized enterprises for the transfer of technology in fields such as light engineering, metallurgy and the food industry are intended to link enterprises in different countries in order to undertake projects in common and even as joint ventures. In addition, UNIDO is anxious to satisfy the information needs of enterprises, R & D institutions, engineering firms, sectoral associations and so on through the Industrial and Technological Information Bank (INTIB) and other means of communication such as specialized publications: information folders on available technological solutions in priority sectors, sources of industrial information, lists of techniques and technological processes etc.

5.4 Programme of industrial co-operation between developing countries

NGOs participate actively in the various UNIDO activities concerning economic and technical co-operation between developing countries (ECDC/TCDC). The various forms of this co-operation have been developed in the light of recommendations adopted at international conferences such as the Lima Declaration and Plan of Action 13/ and the Caracas Programme of Action, adopted by the high level Conference on economic co-operation between developing countries 14/.

12/ Report of the Executive Director 1984, pages 156 and 157, para. 77-79.

13/ ID/CONF.3/31, Chapter IV

14/ A/36/333 and Corrigendum 1

They include:

(a) the preparation of solidarity meetings in least developed countries and round table ministerial meetings in order to bring together developing countries for promotion of industrial development;

(b) follow-up of solidarity meetings already held;

(c) development of joint programmes for specific industrial subsectors;

(d) implementation of the recommendations relating to TCDC reached at the UNIDO System of Consultations. 15/

Until now the presence of financial institutions at these meetings has been favoured. Encouragement of such participation is in response to the chronic problems of financing (particularly foreign exchange) which are a feature of the majority of projects put forward at these meetings. The object is to remove the burden weighing on these projects. The participation of these instititutions is much appreciated and always desired by host countries. Their contribution covers a wide range of activities: participation in investment capital with the financing of agriculture and agro-industry as a priority; loans for feasibility studies, implementation of projects and the establishment of plants; promotion of industrial projects both in the private and public sector at regional and sub-regional level; project identification studies in specific industrial sectors; financing of international travel costs relating to training courses in the context of co-operation between developing countries; financing of training and the experimental stage of projects; co-financing of infrastructural projects and financing of the establishment and development of industrial zones and estates.

Manufacturers' federations, sectoral associations and professional organizations also participate by offering their services, infrastructure and expertise in the preparation of pre-investment studies, establishment of data banks, implementation of projects, training in investment promotion, etc.

A new form of ECDC/TCDC involving enterprise-to-enterprise co-operation in developing countries was born in 1984. Steps were undertaken to strengthen co-operation with a similar programme known by the name of co-enterprise, established by the Islamic Chamber of Commerce, Industry and Trade based in Pakistan. This programme is complemented by a project for the exchange of knowledge regarding enterprise management in developing countries through direct consultations and training of project managers.

In the context of the targets of the Industrial Development Decade for Africa, particular importance has been attached to NGO contributions in a wide variety of fields including mobilization of financial, technical and human resources, co-operation between enterprises and financial and training institutions, establishment and strengthening of sectoral institutions etc. We shall not however deal with this subject here, since other documents cover the subject in greater detail.

15/ Report of the Executive Director, 1983, page 158, para. 118

5.5 System of Consultations

The System of Consultations is a very useful tool for UNIDO in maintaining permanent contact with all parties involved in industrial development, i.e. governments, intergovernmental organizations, industrial undertakings, professional associations, research and development centres, etc. Participation in consultations also permits spontaneous exchange of points of view between interested parties and the cementing of personal and business relationships.

Non-governmental organizations have always been represented on a massive scale either by representatives who are part of the official delegations of their respective countries or by observers sent by national, sub-regional and world sectoral organizations. This is a progressively growing trend. For example, between the First and Second Consultations on the Food-Processing Industry, the number of participants from NGOs included in official national delegations increased from 80 16/ to 89 17/ out of the total and from 25 to 30 in the case of those from developing countries. It is interesting to note, moreover, that at the second consultation, all the elected members of the bureau to direct the deliberations came from NGOs. 18/

These organizations are active not only during the meetings but also before and after. But while it is not difficult to identify activities undertaken jointly with NGOs in the preparation of consultation meetings, (information and awareness meetings, technical seminars), it is a quite different matter to identify follow-up activities undertaken by NGOs, either because the UNIDO secretariat is not always informed or because some of these activities may take place long after the meetings which inspired them. For example, the Second Consultation on the Food-Processing Industry had acknowledged that increased participation of co-operatives and small- and medium-sized enterprises in international co-operation in order to promote the food-processing industry in developing countries would be advantageous from a production, processing and marketing point of view. It had recommended participants to encourage greater participation by:

(a) encouraging and arranging more direct contact between interested managements and their counterparts and assigning competent personnel to development projects and

(b) envisaging the formation of consortia with other interested co-operatives, organizations and enterprises as well as financial institutions in order to strengthen their ability to take part in the implementation of development projects. 19/

It is clear that this kind of recommendation cannot be implemented overnight. It requires a slow evolution which will bear fruit over a period that cannot be determined *a priori*.

16/ UNIDO report on the First Consultation on the Food-Processing Industry, the Hague (Netherlands), 9-13 November 1981, Annex 1, list of participants.

17/ UNIDO, Second Consultation on the Food-Processing Industry with Special Emphasis on Vegetable Oils and Fats, Copenhagen (Denmark), 15-19 October 1984, Annex I, list of participants.

18/ *Ibid*, page 12.

19/ Second Consultation on the Food-Processing Industry with Special Emphasis on Vegetable Oils and Fats, ID/329, page 9, paras. a and b.

In 1981 UNIDO carried out an overall evaluation of the activities of these committees and a re-examination of their contributions in the light of the New Delhi Declaration and Plan of Action, and called a meeting which took place in Vienna in December of the same year. The participants, who came from 8 National Committees, recommended the following in particular:

(a) the National Committees should play an important role in assisting the industrialization process of the developing countries;

(b) communication between the Committees and the UNIDO secretariat should be more direct and substantial;

(c) the Committees should increase their efforts to disseminate nationally information on the role and potential of UNIDO and the opportunities afforded by it; and

(d) closer and more active co-operation should be developed among the Committees themselves. 20/

It was decided as a result of this meeting to strengthen the existing National Committee network and invite representatives of selected Committees to UNIDO headquarters each year, during the sessions of the Industrial Development Board, so as to enable them to have discussions with senior staff of UNIDO and to familiarize themselves with the programmes and activities of the Organization. 21/

Another UNIDO programme where there is a major degree of co-operation with NGOs is constituted by the National Committees for UNIDO.

6. National committees for UNIDO

The International Symposium on Industrial Development held in Athens, Greece, in 1967 had recommended the establishment of a mechanism at national level or the designation of an already existing institution to enable national authorities and representatives of the private sector concerned with industrial development to exchange ideas on the industrial development of their country and to formulate recommendations to the government on all questions relating to the work of UNIDO. These mechanisms constitute an advisory body on the development of industrial policies for governments and provide information on all aspects of UNIDO activities. They also enable members of the private sector to express their views on government industrial development policy and on UNIDO activities in their respective countries.

20/ Report of the Executive Director, 1981, page 158, para. 7.

21/ Report of the Executive Director, 1982, page 171, para. 27.

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4. Annual Report of the Executive Director 1982

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8. ID/CONF.3/31 Chapter IV

9. A/36/333 and Corrigendum 1

10. UNIDO report on the First Consultation on the Food-Processing Industry

11. UNIDO, Second Consultation on the Food-Processing Industry with Special Emphasis on Vegetable Oils and Fats

12. Ibid

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United Nations Industrial Development Organization

Forum on the Involvement of NGOs in the implementation of the Programme for the Industrial Development Decade for Africa*
Abidjan, Ivory Coast, 27-30 August 1985

CO-OPERATION BETWEEN UNIDO AND NON-GOVERNMENTAL ORGANIZATIONS

Corrigendum

Page 3, first paragraph, the last sentence should read

These organizations include the following institutions, both in the public and private sectors: international, regional, subregional and interregional NGOs such as chambers of commerce and industry, and federations of industry; public and private industrial enterprises and financial institutions; public and private universities and industrial research and development institutes; professional and manufacturers' associations; industrial co-operatives and rural development agencies; industrial and trade fairs, and fair organizations; management associations and productivity centres; engineering and consulting firms; and trade unions.

Replace page 13 of document ID/WG.444/5 by the attached text

*Jointly organized by UNIDO and AADFI (Association of African Development Finance Institutions).

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20/ Report of the Executive Director, 1981, page 158, para. 7.

21/ Report of the Executive Director, 1982, page 171, para. 27.

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United Nations Industrial Development Organization

Forum on the Involvement of NGOs in the
implementation of the Programme for the
Industrial Development Decade for Africa*
Abidjan, Ivory Coast, 27-30 August 1985

CO-OPERATION BETWEEN UNIDO AND NON-GOVERNMENTAL ORGANIZATIONS**

Corrigendum

Page 9, second paragraph, lines 2 and 3

For "Proposals for Industrial Associations" read "Industrial Partnership Proposals" and for "Directory of Offers of Co-operation" read "Roster of Resources"

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*Jointly organized by UNIDO and AADFI (Association of African Development Finance Institutions).

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United Nations Industrial Development Organization

Forum on the Involvement of NGOs in the Implementation of the Programme for the Industrial Development Decade for Africa *

Abidjan, Ivory Coast, 28-30 August 1985

REPORT**

Prepared by

UNIDO Secretariat

* Organized jointly by UNIDO and the Association of African Development Finance Institutions (AADFI)

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I. INTRODUCTION

1 - The Forum on the Involvement of NGOs in the Implementation of the Programme for the IDDA was held on the premises of the African Development Bank, Abidjan, 28-30 August 1985. It was organized jointly by UNIDO and the Association of African Development Finance Institutions (AADFI). The Agenda of the Forum is attached as Annex I, the list of participants as Annex II and the list of documents distributed during the Forum as Annex III. The Forum was attended by 60 persons representing 42 NGOs, 5 IGOs, 4 News Agencies and Radio-TV and several ministerial departments from Ivory Coast and Cameroon.

2 - The purposes of the Forum were:

(a) to discuss the existing and potential involvement of the national, regional and international non-governmental organizations (NGOs), business and industrial institutions in the industrial development of African countries and their possible association with UNIDO's technical co-operation programmes in Africa;

(b) to exchange information on activities of NGOs concerned with the industrial and economic development of African countries and to explore ways and means of establishing or improving co-ordination of these activities in order to achieve greater impact on the attainment of the goals of the IDDA programme;

(c) to identify potential programmes and projects in selected priority industrial sectors in which co-operation between UNIDO, NGOs and other relevant parties could be established in order to accelerate industrialization of African developing countries.

3 - The actual and potential involvement of NGOs in the 5 following areas was examined:

i) Involvement of NGOs in the Development of the Agricultural Machinery Industry in Africa;

ii) Involvement of NGOs in the Development of Building Materials Industry in Africa;

iii) Involvement of NGOs in the Development of Food-Processing and Agro-Industries in Africa;

iv) Involvement of NGOs in the Development of New and Renewable Sources of Energy in Africa;

v) and also the "Duality of Debt and Development in the present African context".

II. OPENING OF THE FORUM

4 - The opening ceremony of the Forum was placed under the chairmanship of His Excellency Mr. Séri Gnoleba, Minister of State of the Republic of Ivory Coast. He was accompanied by Mr. Bernard Ehui, Minister of Industry. The ceremony was also attended by Mr. Wila D. Mung' Omba, President of the African Development Bank, Mr. René Amichia, Honorary President of AADFI, Mr. Bentum-Williams and Mr. Apithy, respectively President and Secretary General of AADFI. UNIDO was represented by the Chief of the NGO Section, the Chief of the Co-ordination Unit for the IDDA and two other staff members.

5 - In his introductory speech Mr. Séri Gnoleba expressed the satisfaction of his country to host the Forum and praised AADFI and UNIDO to have jointly organized it. He recalled the experience of the industrial development of Ivory Coast integrated with a sound agricultural development in the last 25 years. He mentioned also that the industrialization of the African countries was hampered by various problems including: small size of the national markets, lack of industrial infrastructure, growing protectionism of the developed countries etc. It is for all these reasons that regional and sub-regional co-operation should be intensified and the geo-political economic integration groupings such as ECOWAS (Economic Community of West African States), SADCC (Southern African Development Co-ordination Conference) and CEAO (Communauté Economique de l'Afrique de l'Ouest) should be strengthened. He invited the non-governmental organizations, particularly the chambers of commerce and industry and the industrial associations to exert their activities and consultative role and provide their views to their respective governments.

6 - In the views of Mr. Wila D. Mung' Omba it was a source of pride for the African Development Bank that AADFI, which it has assisted to establish, has become an eloquent instrument in the effort to accelerate the development process on the African continent. He praised the strong and active bands that link the UNIDO and the Bank. He illustrated the contribution of the Bank in the achievment of the objectives of the IDDA programme. The involvement of the Bank in the African industrialization process has sharply grown in 1984; the Bank Group lending in favour of industrial sector amounted to US$ 196.58 million or 22,4 % as compared to 5,9 % in 1983 while the loans US$ 177.71 million to industry represented 35,2 % of the total loans, against 9,9 % in 1983.

7 - Mr. Bentum-Williams said that as President of AADFI he was delighted to see that the co-operation with UNIDO has led to the organization of this Forum and expressed his hope that from the debates concrete proposals would emerge for the strengthening of the participation of the NGOs in the industrialization process of the African countries.

8 - The Chief of the NGO Section, on behalf of UNIDO, elaborated on the general economic situation and the industrialization of the African countries. He stressed the importance of the role of the NGOs in the promotion of industrialization of developing countries and international co-operation. In order to make use of the enormous capabilities at the disposal of NGOs both, national and international, private and public institutions, UNIDO has been co-operating with a wide range of these organizations in various fields of technical co-operation and promotional activities. In the process of either incorporating resources available with NGOs into its own programmes, or promoting direct co-operation between industrial organizations in developed and developing countries, UNIDO has become convinced of the great potential in this co-operation.

III. ELECTION OF OFFICERS

9 - The participants elected Mr. René Amichia, Honorary President of AADFI and Director General of the "Crédit de Côte d'Ivoire", as chairman of the Forum. The following five vice-chairmen were also elected to direct and summarize the discussions on each of the 5 selected areas:

i) Mr. René Coffi, Director General of the "Société Ivoirienne de Technologie Tropicale" (I2T) on the involvement of NGOs in the Development of Food-Processing and Agro-Industries in Africa.

ii) Mr. A. Diallo, Vice Secretary General of the "Organisation de l'Unité Syndicale" (OUSA), on the involvement of NGOs in the development of the agricultural machinery industry in Africa.

iii) Mr. Koita Fodié, Secretary General of the "Association pour le Développement Naturel d'une Architecture et d'un Urbanisme Africain " (ADAUA), on the involvement of NGOs in the development of building materials industry in Africa.

iv) Mr. Kana Mutombo, Secretary General of the "Union des Producteurs d'Energie en Afrique" (UPDEA), on the involvement of NGOs in the development of new and renewable sources of energy in Africa.

v) Mr. Tigoué Kouanvi, Executive Secretary of "Union Africaine et Mauricienne de Banques" (UAMB), on the duality of debt and development in the present African context.

10 - The first session of the Forum was dedicated to the presentation to the participants of the IDDA programme and the UNIDO activities in general. This presentation was made respectively by the Chief of the Co-ordination Unit for the IDDA, and a staff member from Programme Development and Evaluation Branch.

11 - In his speech the Chief of the Co-ordination Unit for the IDDA recalled the importance accorded to industrialization in the Lagos Plan of Action by the Heads of State and Government of the Organization of African Unity (OAU), in which industrial development has been accorded second priority after self-sufficiency in food.

African countries are urged to do everything in their power to achieve self-sufficiency during the Decade in the food, building materials, clothing and energy sectors. He stressed also the linkage between industry and agriculture. The increase of food production depends on the provision by industry of a series of pre and post harvesting equipment, tools, machines and products. The IDDA, proclaimed by the OAU Heads of State and Government in the Lagos Plan of Action and by the United Nations General Assembly in December 1980, aims at increasing greater awareness in Africa by the implementation of accelerating the industrialization process on the continent as well as on mobilizing greater international, technical and financial support to the endeavours of the African countries. The IDDA programme, which has been jointly prepared by the Secretariats of the Economic Commission for Africa (ECA), of the Organization of African Unity (OAU) and of UNIDO on the request of the United Nations General Assembly is divided into two phases: the preparatory phase (1982 - 1984) and the implementation phase (1986 - 1990). During the first phase actions were taken in preparation for the implementation of the Programme of the Decade at national as well as sub-regional and regional levels.

12 - At the national level many countries have established the necessary instituional infrastructure (national co-ordinating committees, operational focal points) and incorporated the principles and ideas of the IDDA in their national plans. At the sub-regional and regional levels an integrated industrial programme has been drawn up following 4 sub-regional meetings organized in 1983 and 1984 by UNIDO in co-operation with ECA and OAU. This programme has been endorsed by the Conference of African Ministers of Industry and by the 4th General Conference of UNIDO. In the course of this phase UNIDO has assisted the countries and the sub-regional organizations in strengthening their industrial institutional infrastructure, the development of pilot demonstration plants, the training of industrial manpower, the organization of investment promotion activities, etc.

13 - The next phase will focus on the implementation of this programme. The assistance from the international community in general, and from the NGOs in particular, will be necessary in the development of core industries, small and medium size industries, industrial manpower and technological capabilities, the mobilization of financial resources, the acquisition of technologies, etc.

14 - A staff member from the Programme Development and Evaluation Branch made a presentation on UNIDO's technical co-operation activities, stressing aspects, such as the development of technical assistance programme, project formulation, implementation and financing.

IV. THE INVOLVEMENT OF NGOS IN THE DEVELOPMENT OF FOOD-PROCESSING AND AGRO-INDUSTRIES IN AFRICA

15 - Mr. A. C. Mosha, Director, Food Science and Technology, Tanzania, Food and Nutrition Centre and UNIDO consultant on food-processing and agro-industries introduced the subject.

16 - Several types of NGOs are involved in activities related to the development of food-processing and agro-industries. The strongest NGOs are those which grew from the traditional community organizations and selfhelp groups; some of their activities are of industrial (rural industrialization) nature which comprise storage, traditional processing, marketing and distribution. The church affiliated and other voluntary organizations linked with international ones provide assistance and promote co-operation at the grass-root level among the members of the communities in which they are active. There are other types of NGOs, such as national chambers of commerce and Industry, manufacturers associations, food science and technology associations, co-operatives, universities and research institutions, etc, which are already involved in the promotion of the food processing industry.

17 - It seems that they have succeeded in intervening where need was felt most: creation of awareness among communities, research, laboratory experiment, training, mobilization of resources etc. The main sources of difficulties in the development of food-processing industries, which emerged from the discussions are: unappropriated conception of the projects, lack of practical knowledge in the formulation and evaluation and adequate structures for the monitoring of the implementation of the projects, poor qualification of human resource and insufficient availability of raw materials.

18 - After the introduction of the item by Mr. A. C. Mosha the participants expressed their views through questions and comments. In order to meet the objectives of the IDDA to ensure self-sufficiency in food and provide raw materials for the food processing industries, it is necessary for the Government of African countries to adopt policy measures to encourage the

increase of agricultural production: appropriate prices to the producers, better identification and preparation of projects, improvement of institutional infrastructure for project implementation and monitoring. There is also a need to associate NGOs in policy formulation and to establish better co-ordination between all the concerned parties (co-operatives, R+D institutions, universities, women organizations, trade-unions, etc.) in developing and upgrading local technologies, manpower development, andprocessing local raw materials. NGOs have an important role to play in the development of standards and adoption of quality control measures which correspond to the needs of the region, the need of utilizing local expertise and to increase the inter-African trade have been stressed by several participants. It was also found necessary to develop a packaging industry utilizing local raw materials to supply agriculture and agro-industry with appropriate containers.

19 - Many of the remarks and suggestions put forward during the discussions on this subject are applicable to other subjects of the Forum and were reiterated in the following sessions. They will not be repeated in this report, unless this repetition is absolutely necessary to stress the importance of the remark or suggestion for that particular subject.

20 - In the development of agro- and food-processing industries the following areas of co-operation were identified:

i. Technology transfer: It should be appropriate and suitable for local conditions. It should cover from production and processing, to marketing and distribution, including creation of research and development capability, upgrading local technologies, fabrication of machines and spare parts, setting up demonstration model units in selected countries.

ii. On-the-job-training: this might necessitate the establishment or improvement of infrastructure and skill, such as training institutions and personnel, organization of specialized training workshops, etc.

iii. International NGOs could exert pressure and influence in the North/South dialogue so as to secure a fair deal for the African countries. They could influence pricing policies to ensure better producer prices for African commodities in the world market. They could influence the lowering of trade barriers, such as tarrifs and the quota system, thus expanding commodity markets for African countries.

iv. Preparation of feasibility and pre-investment studies for the establishment of an integrated food-processing industry: this would reduce the risk of selecting unappropriate technology and financial losses.

v. Consulting services: they could be in the form of studies on organization, economic, technical, management of industrial plants, particularly of small scale nature and marketing as well as several relevant aspects of technology.

vi. Joint-ventures: they might cover joint production, processing and marketing for mutual benefit. International NGOs could be shareholders and offer financial and managerial collaboration.

vii. Co-operatives offer a good channel for mobilization of resource. Loans could be given by co-operative financial institutions along with technical know-how and guarantees in the form of export credit.

viii. Many existing plants in the food processing sector from cereal milling, to fruit and vegetable processing require rehabilitation, complete overhaul or full replacement with modern plants so as to increase capacity utilization.

ix. Exchange of information betweeen R+D institutions, universities and manufacturers on the developed technologies.

x. Identification and exchange of African expertise for its utilization in the implementation of industrial projects.

V. THE INVOLVEMENT OF NGOS IN THE DEVELOPMENT OF THE AGRICULTURAL MACHINERY INDUSTRY IN AFRICA

21 - Mr. Mohamed Béavogui, Director a.i. Department of Design, African Regional Centre for Engineering, Design and Manufacturing (ARCEDEM), Ibadan and UNIDO consultant introduced the subject.

22 - The level of production of agricultural machinery is very low in the African countries. The local production can cover only 10 % of the total requirements; moreover the locally manufactured equipments include up to 60 % to 80 % of imported components. The production is limited to the manufacture of simple tools, implements, simple agricultural and post harvest machinery. The motorized and complicated machinery is generally imported and bought by the big farmers, while the rural population (which accounts for more that 80 % of the total population) absorbs less than 5 %.

23 - A nucleus of engineering industries, which is at its formative stage, participates in the fabrication work, sub-assembly/assembly operations, and in some cases manufacture of spare parts for tractors as well as for processing and storage facilities of a complicated nature.

24 - Non-governmental organizations both at national and international levels play a significant role at all the stages of the development of agricultural machinery:

i. In many African countries, universities and national and sub-regional R + D institutions carry out a lot of research work in the field of design, development and testing of agricultural machines and equipment. Unfortunately, this work relates more to the theoretical than the practical aspect, that is giving answers to the real needs of farmers and manufacturers. A lot of prototypes exist today in faculties of engineering and/or technology, but they have never been manufactured commercially, because of the missing link between universities, R + D institutions, manufacturers and users.

ii. Associations of industrial manufacturers, co-operatives or associations of artisans are directly involved in the manufacture of agricultural machinery and implements. Religious bodies like Christian associations have some mechanical workshops in Tanzania, Sierra-Leone etc. where simple equipment is manufactured.

NGOs are also involved in marketing, repair and maintenance and training through the organization of fairs, workshops and seminars.

25 - During the discussions which have followed the introduction of Mr. M. Béavogui the participants stressed the high prices of agricultural machinery and the difficulties for the small farmers to obtain loans for its purchase. The necessity for these farmers to form co-operatives or other types of associations to group their purchasing orders and pass them directly to the producers was recognized. They rose up the importance of repair and maintenance of agricultural machinery, the training of technicians, the necessity to upgrade the skills of rural blacksmiths, the co-operation between R+D institutions, universities and associations of manufacturers to produce agricultural machinery adapted to the needs of farmers and the nature of each soil. Unappropriate tools might worsen the effects of erosion and disturb the precarious eco-system, particularly in the Sahelian countries. The contribution of the farmers and the technologies being utilized in the rural areas should not be under-estimated or disregarded, in the contrary, when it is appropriated they should be upgraded and disseminated.

26 - The following areas, where co-operation between national and international NGOs is possible, were identified:

i. National and interntional NGOs could work together on the improvement of design and adaption of farm machinery and equipment in order to satisfy the market requirements. Exchange of prototypes should be encouraged. These prototypes should be made available free to industries for adaptation after successful trial.

ii. Joint ventures for the manufacture of selected agricultural equipment can be developed through co-operation with international NGOs.

iii. The co-operation in the field of training should aim to strengthen the capabilities in evaluation, design development and production of prototypes of equipment to suit local manufacturing conditions and markets. It can be in the form of establishment of pilot and demonstration units, especially for small and medium-scale production, and for the upgrading of the skills of rural blacksmiths and sub-urban artisans.

iv. Joint studies and surveys would be a good approach to allow complementarity and achieve more realistic results. Joint workshops/seminars could be organized to initiate or conclude studies as well as debate on a specific item, covering the production and use of agricultural machinery and equipment in Africa.

v. Some regions are already having a substantial amount of experience in the organization of co-operatives or associations working in this priority area in Africa. Their assistance in solving managerial and organizational problems of local NGOs as well as exchange of experience would be of great help.

VI. THE INVOLVEMENT OF NGOS IN THE DEVELOPMENT OF BUILDING MATERIALS INDUSTRY IN AFRICA

27 - Mr. Abraham Ouattara, Director of the Laboratory for Building and Public Works in Abidjan, Ivory Coast, presented the discussion paper on the item he had prepared together with Mr. Michel Titecat, Chief of the Research Department of the same laboratory.

28 - The construction and building materials industry in African countries are divided in two well defined sectors:

i) the modern sector, which includes civil engineering works, administrative buildings and blocks, offices, banks and shops of the European type, high and medium-standing housing, industrial plants and infrastrucutres, etc., utilizing modern machines, cement, electricity, heavy transport equipment, imported raw materials, skilled workers and requiring heavy capital investments;

ii) the informal sector, oriented to meet the needs in housing for the bulk of the urban population and all the rural inhabitants, utilizing mostly human energy, local raw materials, limited industrial products, scarce capital investment and poorly skilled workers.

29 - NGOs are active in each of the two sectors, but the attention of the participants was concentrated mostly on the second sector. In fact it was recognized that the actions of many voluntary and other NGOs have focused on the construction of houses and the production of building materials for the low income group of the population. These actions have taken place: directly at the level of execution and participation with technical training, assistance to self-building and setting up of co-operatives. It can be observed that these actions have been directed towards:

(1) the design and promotion of alternative technologies which demand less imported tools, equipment, special building materials and components and raw materials, involve more local know-how, stabilized clay, plaster, etc.

(2) the adaptation of architecture, town planning and urban techniques to the African modes of life.

(3) the promotion of the production of intermediate products, basic tools and construction equipment.

30 - The participants have recognized the validity of the local building materials in substitution of imported materials for the construction of community buildings, such as schools, maternity wards and hospitals as well as to meet the housing needs of large social groups of the population and for agro-industrial needs (silos, etc.). They have given examples of positive actions which have been conducted in several African countries, particularly in the Sahel, but also in Egypt, Nigeria, Tunisia etc. Considering their low cost, these materials are very appropriate for utilization in the national building programmes not only in the rural areas but also in the cities. The popularization of building technologies utilizing local raw materials faces psychological constraints among certain groups of the urban population, which are not justified by the quality of the buildings themselves but by lack of information and proper education of the population. It is only by concrete demonstrative examples that this psychological resistance will be overcome. In fact ad-hoc specialized studies on the optimization of local raw materials have shown that many technologies developed in this field are reliable. The need is now to move from experimentation to dissemination.

31 - The necessity to establish small cement plants has been also recognized in view of the small size of the national markets and the difficulties in the management of big plants. Their small size make it possible to install them in the most appropriate sites, where the raw materials and energy are available as well as where the demand of cement is bigger, thus reducing the transportation costs.

32 - The following areas were identified as those in which co-operation of NGOs should be pursued and strengthened:

i. Consultation and exchange of information among those NGOs engaged in the development of locally available building materials and construction technologies in order to adopt or improve the specifications, standardizations and quality control as well as to disseminate information on the results achieved;

ii. Any programme in this field should adopt a multidisciplinary approach with teams of specialists from technical, economic, financial, social, public health and sociological sectors, to ensure better acceptance and participation from the concerned populations; therefore co-operation between NGOs active in all these fields would be appropriate;

iii. Preparation and organization of common training workshops for management as well as technical staff would reduce the cost and improve the final products;

iv. Exchange of information on the developed technologies between the NGOs and the intergovernmental R + D organizations.

VII. THE INVOLVEMENT OF NGOS IN THE DEVELOPMENT OF NEW AND RENEWABLE SOURCES OF ENERGY IN AFRICA (NRSE)

33 - This subject has been introduced by Mr. Y.R.Brancart, Chief of the Production Service, Department of Study and Technical Research, "Energie Electrique de Côte d'Ivoire", on UNIDO request, in replacement of Mr. Lamine Keita who could not attend the Forum.

34 - The level of energy consumption in African countries is low in comparison with world consumption. However, they have significant potential energy resources with regard to traditional and renewable energy and a scarcity of commercial resources. The demand of energy is also growing more steadily than its production in many countries.

35 - Under these circumstances, and in order to satisfy runaway growth in energy demand, African countries are forced to manage demand more effectively by a rigorous selection of priorities, and by economy and conservation measures, while stimulating and encouraging alternative energy solutions based on local resources. Thanks to laboratory research and field experiments, the spread of new technologies and their adaptation to the socio-cultural environment, the results achieved in several African countries - particularly those of the Sahel - in the development and applications of renewable energy are encouraging, although certain difficulties must be overcome. NGOs, in particular R+D institutions, universities, voluntary organizations etc. have made an important contribution in this development.

36 - Use of renewable sources of energy is aimed at satisfying small-scale decentralized energy needs in rural areas. It requires simple technologies, cheap and local materials. Several NGOs contributed to the construction and distribution of improved stoves with the support, in most cases, of women's organizations whose role is vital for propaganda and promotion. The development and testing of prototypes and the improvement of performance are generally carried out by laboratories or specialized institutes. They also achieved significant results in the fields of biogas, windpumps, solar energy etc.

37 - The participants recognized that Africa has potential for the development of NRSE and encouraging results have been achieved in research in this field; however, there is a lack of financial resources to be allocated to he development of NRSE. Furthermore, it is very unlikely that resources will grow in future at a satisfactory level, therefore there is a need for co-operation between African countries as well as between NGOs of various countries. The provision of commercial energy to the rural areas requires investments that make it too expensive and less competitive in many cases than the energy provided by NRSE. The cost of this latter energy is decreasing due to the application of new technologies, however, it can be reduced further by local production of equipment. The technologies developed in Africa as well as elsewhere should be made available to the NGOs working in Africa. Examples of successfull technologies were given in the following fields: solar energy, water lifting, modular television receiver sets, production of alcohol from agricultural by-products, improved stoves, mini-hydro electric power generators, etc. In Kenya, Sudan, Zambia, etc. national associations of NGOs active in the field of development of NRSE were established and they are working in contact with R+D institutions and international NGOs.

38 - Despite these encouraging results, the development of new and renewable sources of energy faces various constraints:

i. At the institutional level the renewable energy sources sector is characterized in most countries by the multiplicity of the bodies involved and belonging to differe . supervising departments. The circulation of information is thus blocked and there is a lack of co-ordination and coherence in programmes of activities.

ii. In the majority of African countries there is a shortage of specialists in the various areas of development and management of new and renewable energy sources. There are few experienced professionals in research, design and implementation. In rural areas the traditional blacksmiths lack the necessary skills in this field.

iii. Information on possible applications of renewable energy sources, the cost of various types of equipment, the advantages and drawbacks compared with conventional equipment is still scarce in some countries.

iv. With regard to technical maturity, some equipment for NRSE has become very reliable. However, the absence of a technological environment in many African countries limits local production of spare parts for repair and maintenance.

v. The acceptance of some equipment for NRSE by the rural populations concerned is a priority target. Since the adoption of this equipment might imply changes in consumption and work habits for the rural population, its acceptation is rather slow.

vi. The limited resources at their disposal and the high costs of the equipment constitute an obstacle to the expansion of the programmes of the NGOs.

39 - As far as co-operation is concerned, NGOs could intensify the activities in which they are currently involved and help in solving the above constraints, in particular:

i. to strengthen the efforts of research, training and dissemination of the technologies developed by the NGOs;

ii. to intensify the occasions of meetings and fora for exchange of experience and expertise between NGOs engaged in the development of NRSE;

iii. to promote joint-ventures between African and non-African NGOs;

iv. to promote co-ordination of actions within the same country and at sub-regional level to avoid unnecessary duplication of activities.

VIII. THE DUALITY OF DEBT AND DEVELOPMENT IN THE PRESENT AFRICAN CONTEXT

40 - Mr. N.N. Susungi, Chief of the Division of Industry and Development Banks, and Mr. T.I.S. Vusi, Senior Financial Analyst from the same Division of the African Development Bank introduced the discussion paper they had prepared on the above subject.

41 - The African external debt has been evaluated at US$ 130 billion. The borrowing capacity as well as the structure of the debt vary from one country to the other. In fact each country possesses a unique debt profile, because in more than 25 years of independance the African countries have built up an economic structure based on their level of development at the moment of independance, their natural resources, their development priorities, their commercial and political relations with the rest of the world etc. Therefore in considering the external debt of African countries, attention should not concentrate only on the absolute and relative levels of indebtedness of each country, but also on the structure of the total debt in terms of funding sources and aggregate sectoral allocation of these resources.

42 - In Africa, governments and government agencies are the prime consumers of externally mobilized credits. The credits have been contracted in many cases for investments in the productive sector as well as in sectors which are not directly productive but provide basic infrastructure and services necessary for the development of the productive ones. These investments should have generated export earnings for the repayment of the credits.

43 - The real issue of Africa's external debt is not its magnitude, but the unability of the export revenues to reach the levels necessary to make interest payments and at the same time finance necessary current imports to the country. The reasons are to be found in the deteriorating terms of trade that have been experienced by many countries, and in an examination of the investments that were made with the loans in order to see to what extent they could have contributed to generate export revenues.

44 - Case studies were presented on the following countries: Cameroon, Congo, Egypt, Ghana, Ivory Coast, Kenya, Mauritania, Morocco, Nigeria, Sudan, Tunisia and Zambia.

45 - In the course of the discussions many participants took the floor to express their views on several aspects of the links between financial resoures and industrial development. A number of the financial problems African countries are facing are due to the reimbursement of debts contracted to finance the implementation of large scale projects, which did not produce the expected results. The medium and small scale local entrepreneurs meet several problems in obtaining credits for the realization of their projects. The rates of interest are generally very high. It is important for the countries to invest in small scale projects because they require less financial resources and are easier to be managed. These projects should have a multiplying effect on the development of other sectors such as energy, agricultural production and building industries. The development banks are not able to meet all the financial requirements of the African countries industrialization, therefore it is necessary to look for other alternative resources. The mobilization of internal as well as external resources should be stimulated. The failure of many industrial undertakings is due to the high cost of expatriate expertise and to the weakness in the negotiation of the contracts.

46 - The following are the among the main conclusions and recommendations:

1. priority should be placed on the direct stimulation of those sectors which can generate or save foreign exchange in particular the rehabilitation of existing industrial capacity;

ii. renewed emphasis should be placed on small and medium scale enterprises processing locally available raw materials;

iii. NGOs and in particular the industrial private sector, should be given more room to function without unnecessary bureaucratic constraints;

iv. efforts should be made by governments as well as by NGOs to increase intra-African trade, because therein lies a wide scope for raising the level of capacity utilization for many industries.

v. special stress should be put on the development of qualified financial and industrial manpower to lessen the dependance of Africa on expatriate expertise which causes heavy pressure on several industrial plants.

In contracting debts, attention should be paid to the impact that any new debt has on the overall debt service profile of the country and that commercial type of debts are not used to finance non productive sectors.

IX. RESOURCES IDENTIFED WITH THE NGOS:

47 - During the public discussions and also in direct contacts with the represented NGOs, the following resources have been identified:

i. Environment and Development in the Third World ENDA Tiers Monde invites all NGOs to attend the workshops it organizes in Senegal on: environment protection, energy aspects of development, etc. There are possibilities for fellowships for African participants.

ii. Lega Nazionale Cooperative e Mutue has expressed its interest in co-operating with UNIDO and African NGOs in the
   a) organization of training workshops in the fields of development of new and renewable sources of energy, agro-industries, building materials utilizing local raw materials, etc.;
   b) technical assistance to existing industries, particularly to co-operatives;
   c) establishment of industrial enterprises in several fields;
   d) technical assessment and dissemination of technologies jointly developed with African NGOs;
   e) transfer and adaptation to African environment of technologies developed by the Italian Institute for Co-operation and Innovation of Technologies.

iii. ADAUA (Association pour le Developpement Naturel d'une Architecture et d'un Urbanisme Africain) offers the possibility to organize jointly with UNIDO a workshop on low cost housing and the utilization of locally available raw materials in the construction industry in Africa. This workshop should be open on a first priority to the responsibles of public works development in the respective African countries.

iv. ENI/SAIPEM would be interested in continuing contacts with African NGOs Environment Network (ANEN) and UNIDO for the formulation and implementation of a project in the field of integrated rural development.

v. The World Association of Small and Medium Enterprises (WASME) offers to organize jointly with UNIDO a workshop in India to sensibilize African decision makers on the viability of small scale cement plants.

vi. FIDIC (Fédération Internationale des Ingénieurs Conseils) proposes to

a) assist the Federation of African Consultants in setting-up their organization and start their work;

b) establish co-operative arrangements for joint implementation of projects between their respective members; establishing joint ventures and/or twinning agreements.

vii. The African NGOs Environment Network (ANEN) proposes to co-operate with UNIDO in identification of expertise, organization of workshops/seminars and in dissemination of information on UNIDO activities and the IDDA in particular and the establishment of a directory of African NGOs.

viii. The Association of African Universities (AAU) offers to co-operate with UNIDO on

a) the organization of training workshops, seminars etc. The AAU members could be asked to design and run them on a regional basis on selected technological issues;

b) the identification of African expertise available at African universities. The AAU is preparing a study of the expertise available within its member institutions in the fields of: agriculture, science and technology, medical sciences and economics.

X. RECOMMENDATIONS TO UNIDO

48 - The participants at the Forum made the following recommendations to UNIDO:

i. to identify the expertise available within the African NGOs for its possible utilization in technical assistance projects in various sectors in Africa;

ii. to help to disseminate the technologies developed by the NGOs and intergovernmental organizations within the region through the promotion of co-operation and co-ordination of activities between NGOs and the organization of exhibitions of these technologies;

iii. to co-operate with the African Regional Centre for Technology for the preparation of a comprehensive directory of appropriate technologies in Africa;

iv. to assist the African national organizations in the etablishment and/or strengthening of regional and sub-regional associations such as the Association of African Food Producers;

v. to collaborate with the African NGOs Environment Network in the preparation of a Directory of African NGOs active in economic and industrial development;

vi. to promote twinning agreements between South/South and North/South NGOs;

vii. to establish contacts with other organizations engaged in the development of NRSE such as the ANEN, the Commonwealth Research Center, etc. to exchange information and co-ordinate actions.

XI. CONCLUSIONS

49 - The Forum recognizes the need for:

- the further strengthening of the co-operation between UNIDO and NGOs, business and industrial institutions;
- the establishment of new and strengthening of the existing national institutions and their mobilization for the identification and implementation of projects within the African Industrial Development Decade and other programmes of industrial co-operation;
- the establishment of national centres/mechanisms for science and technology information and dissemination with active participation of NGOs, universities, R and D institutions, chambers of commerce and industry, manufacturers asssociations etc.

50 - The Forum concluded that non-governmental organizations have an important role to play in participation with governments, intergovernmental organizations and with UNIDO in technical co-operation programmes and other activities to foster the industrialization process in African developing countries. It is therefore necessary to involve this organization in the process of planning at national and technical levels.

ANNEX I

FORUM ON THE INVOLVEMENT OF NGOS IN
THE IMPLEMENTATION OF THE PROGRAMME FOR THE IDDA

AGENDA

WEDNESDAY, 28 AUGUST 1985

7:30 - 8:30	Registration and administrative matters
9:00	Opening ceremony
	- Welcome address by Mr. John Bentum-Williams, Chairman of the Association of African Development Finance Institutions (AADFI)
	- Address by the Chief of the NGO Section, UNIDO
	- Address by Mr. Wilda D. Mung' Omba, President of the African Development Bank (ADB)
	- Opening address by His Excellency Mr. Seri Gnoleba, Minister of State of the Ivory Coast
10:15 - 11:30	- Election of the Chairman and 5 Vice-chairmen - Adoption of the Agenda - Presentation of UNIDO activities and the Industrial Development Decade for Africa
11:30 - 13:00	Introduction of the subject on "Food-processing and Agro-Industries"
	- Discussions on possible forms of NGO co-operation
15:00 - 16:00	Continuation of discussions
16:30 - 19:00	Introduction of the subject on "Agricultural Machinery Industry"
	- Discussions on possible forms of NGO co-operation

THURSDAY, 29 AUGUST 1985

8:30 - 10:00	Introduction of the subject on "Building Materials Industry"
	- Discussions on possible forms of NGO co-operation
10:30 - 12:30	Continuation of discussions

15:00 - 16:30 Introduction of the subject on "Energy"

- Discussion on possible forms of NGO co-operation

17:00 - 18:00 Continuation of discussions

FRIDAY, 30 AUGUST 1985

8:30 - 10:00 Introduction of the subject on "Duality of Debt and Development in the present African Context"

10:30 - 12:00 Continuation of discussions

15:00 - 16:30 Presentation of reports

17:00 Closing ceremony of the Forum

- Final Communiqué read out by the Secetary General of AADFI

- Address by Mr. Wila D. Mung' Omba, President of the African Development Bank (ADB)

- Closing ceremony by His Excellency Mr. Ehui Bernard, Minister of Industry of Ivory Coast

ANNEX II

FORUM ON THE INVOLVEMENT OF NGOS IN THE IMPLEMENTATION OF THE PROGRAMME FOR THE IDDA

28-30 AUGUST 1985
ABIDJAN IVORY COAST

FORUM SUR LA PARTICIPATION DES ONG A LA MISE EN OEUVRE DU PROGRAMME POUR LA DDIA

28-30 AOUT 1985
ABIDJAN COTE D'IVOIRE

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UNIDO was represented by 4 staff members:

Chief of the NGO Section and 1 staff member from the NGO Section

Chief of the Co-ordination Unit for the IDDA

and 1 staff member from the Programme Development and Evaluation Branch

ANNEX III

FORUM ON THE INVOLVEMENT OF NGOS IN THE
IMPLEMENTATION OF THE PROGRAMME FOR THE IDDA

LIST OF DOCUMENTS AND CONTRIBUTION RECEIVED FROM THE PARTICPANTS

1 - Speech of Mr. Wila D. Mung'Omba, President, African Development Bank
2 - L'Association pour le Développement Naturel d'une Architecture et d'un Urbanisme Africains (ADAUA)
3 - International Association: Panafrican Institute for Development (PAID)
4 - Contribution of the Association of African Universities
5 - Note de presentation de la Fédération des Chambres de Commerce de l'Afrique Centrale (FCCAC)
6 - Fédération des Consultants Africains
7 - The Role of Trade Unions in Industrial Development by Mr. J. Rwegasira, The Union of Tanzania Workers (JUWATA)
8 - African Institute for Higher Technical Training and Research
9 - Quelques Aspects de l'Engagement d'ENDA et d'Autres ONG en Technologie et dans le Développement de l'Artisanat et de la petite Industrie en Afrique by ENDA
10 - Communication de l'Alliance Coopérative Internationale Bureau Régional pour l'Afrique de l'Ouest
11 - Note on Mini Cement Plant by Mr. R. Rajamani, Director, Movers Private Limited
12 - Rural Industrialization and the Industrial Development Decade for Africa by Dr. Okorie O. Okorie
13 - Société Africaine des plantations d'Heveas
14 - Echanges et Consultations Techniques Internationaux (ECTI)
15 - Bulletin Trimestriel d'Informations, Fédération des Consultants Africains (FECA), Premier Trimestre 1985
16 - Institut de la Planification et de la Recherche pour l'Environnement et le Développement (RPIED) par Dr. Ibe Kolou Kwamey, Directeur Exécutif

17 - The role of indigeneous entrepreneurs (through NGOs actively involved in industrial innovations) in the development of market research for the identification of industrial opportunities and consequently exchanging their development and implementation by Mr. H. Moses-Nuyaba, President CMD, West African Market Research and Investment Analysis Agency (WAMARIAA)

18 - The Regional Standardization System in Africa by Mr. Z. Felleke, Secretary General, ARSO

19 - The Duality of Debt and Development in the Present African Context by Mr. N. Susungi, Chief of Division and Mr. T. Vusi, Senior Financial Analyst, both of the Division of Industry and Development Banks, African Development Bank

20 - Multivalent Training Centre for the Integrated Rural Development by SAIPEM/CORI

21 - Rapport Economique et Social par l'UGTT, pour une société démocratique et juste

ANNEX IV

FORUM ON THE INVOLVEMENT OF NGOS IN THE
IMPLEMENTATION OF THE PROGRAMME FOR THE IDDA

LIST OF UNIDO DOCUMENTS DISTRIBUTED ON THE OCCASION OF THE NGO FORUM IN ABIDJAN

1. Annual Report of the Executive Director 1984 ID/B/340
2. Aide-Mémoire V.85-23217
3. Note for the participants
4. Provisional Agenda
5. The Involvement of NGOs in the development of new and renewable sources of Energy in Africa
6. The Involvement of NGOs in the Development of the Agricultural Machinery Industry in Africa
7. The Involvement of NGOs in the Development of Food-Processing and Agro-Industries in Africa
8. The Involvement of NGOs in the Development of building materials Industry in Africa
9. Progress Report on the Implementation of the Lagos Plan of Action and the Final Act of Lagos (The Industrial Development Decade for Africa, IDDA).
10. Linkage between Industry, Agriculture and Food Production, Analysis and Proposals for Action
11. Africa's External Debt in Respect of the Industrial Sector, Review, Conclusions and Recommendations
12. Industrial Development Decade for Africa (IDDA), Infomation Note
13. The Co-operation between UNIDO and NGOs
14. University-Industry linkage
15. Report on the Identification and application of Relevnt New Technologies for the Implementation of the Programme for the Industrial Development Decade for Africa